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ABSTRACT

The South Dakota Core Curriculum Project involving the career ladder approach to health manpower training, which began in 1970, had seven objectives including the following: (1) To organize a Health Manpower Council for the entire State; (2) to define the areas of basic commonality among the various training programs; and (3) to develop a core curriculum for health manpower training on a statewide basis. Over a 3-year period, the Health Manpower Council (70 representatives from educational, health-care, and related institutions), through the work of its eight subcommittees and three council workshops, developed a core curriculum. This curriculum allows a student ultimately to possess a foundation of knowledge and skills on which to build occupational mobility and permit an upward academic pursuit. (The appendix, comprising three-fourths of this report, contains the curriculum's topical content outline and 785 measurable behavioral objectives. The content is in two segments: (1) Primary level--that collection of fundamental tasks, skills, knowledge, and attitudes common to all health manpower training/education curricula--which includes three units: Health Care Delivery System, Introduction to Health Science, and Emergency Medical Care; and (2) secondary level--that collection which is common to more than one type of curricula--which includes six areas: Anatomy and physiology, chemistry, interpersonal relationships, microbiology, nutrition, and public health and health-care delivery.) (EM)

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To Solve Health Manpower Supply and Utilization Problems on a Statewide Basis, South Dakota Has Instituted a Unique, Promising Program--

SOUTH DAKOTA STATEWIDE CORE CURRICULUM, CAREER LADDER, AND CHALLENGE SYSTEM

A CASE HISTORY

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Core Curriculum, Career Ladder and Challenge System: A Case History

AN INTRODUCTION

The Need For An Effective New Approach

"It is health which is real wealth and not pieces of gold and silver."

–Mahatma Gandhi

Among the 50 states South Dakota is 16th in size, 45th in population and 49th in physician-to-patient ratio. The latter statistic is indicative of prevailing health-care problems in the rural-and-reservation commonwealth where considerable distances often separate citizens from limited treatment facilities and trained personnel. (In 1974, 17 of the state's 64 counties had no doctors and 21 counties were without a functioning hospital.)

Analysis also has revealed that in addition to the physician-to-patient disparity, there is possibly a shortage of allied health and nursing specialists, further complicated by maldistribution of such individuals who are disproportionately concentrated in and around cities and educational centers.

To overcome these various shortcomings, South Dakota governmental agencies, health-care providers and concerned consumers have begun a multi-faceted attack on the overall problem. One element of the effort has been a survey of the training/education system which produces allied health and nursing manpower in the state–and an outgrowth of that study has been the development of a Core Curriculum, Career Ladder and Challenge System which is unique in its scope and approach.

The narrative which follows traces the South Dakota project from genesis to the first stages of implementation. The activity is on-going, of course, so not all the results are in; but after three years of patient persistence on the part of those involved, it has reached a point where a review of the process and its accomplishments to date is warranted for the possible benefit of others who might have interest in a similar undertaking.

I

Genesis Of A Statewide Experiment

"Core is a concept, not a formula or a strait jacket."

—Thomas Klopfenstein, Ph.D.

The growing health manpower dilemma in South Dakota demanded action, and in 1967 the first specific efforts to define the problem and to seek solutions were begun.

With much individual leadership provided by Robert H. Hayes, M.D. (then director of the South Dakota Regional Medical Program and later State Secretary for Health), preliminary discussions among health leaders and educators were generated to bring the somewhat blurry manpower picture into focus. At the same time SDRMP and the South Dakota Comprehensive Health Planning agency cooperatively pooled resources to approach the matter jointly.

After several meetings it became apparent that progress would be impeded without some full-time management, and in July of 1970, a Coordinator of Health Manpower Development for South Dakota [Donald G. Brekke] was appointed. The newly created position was funded mutually by the Regional Medical Program and Comprehensive Health Planning.

During this period the "core curriculum" or "shared knowledge" concept for allied health education was being implemented in a number of individual institutions throughout the United States, and the pros and cons of the core philosophy were widely discussed. A paper titled "Core Curriculum in Allied Health Education" (read by Joseph Hamburg, M.D., of the University of Kentucky Medical Center at the 65th annual Congress on Medical Education) proposed that "the development of. . . a common educational base for the allied health professions would seem to permit greater career mobility vertically and laterally than has heretofore existed." Such mobility was one of the major objectives being considered in South Dakota, and while the manpower coordinator was developing a statewide inventory of trained personnel, county health-care profiles and other basic planning tools, the core curriculum idea grew in interest among the agencies and individuals involved.

At that particular time, 26 different institutions in South Dakota offered 54 accredited health career training programs, with still others on the academic drawing boards. In general, these proliferating programs had little relationship one to the other, and there was no overall plan to govern their development. The need to make the most efficient and effective use of the state's limited educational dollars (both private and public) led to the active consideration of a core curriculum project as a possible way to coordinate allied health and nursing education on a statewide basis and thus to achieve more systematic production and utilization of health manpower.

An initiatory plan was outlined and discussed with interested educators, health leaders and federal officials, including Gunnar E. Sydow, D.D.S., M.P.H., Director of Region VIII, Division of Health Resources Development, who lent an encouraging ear to the idea. The opportunity to test the core curriculum concept in a pilot project across a broad spectrum of programs and institutions (hospitals, colleges and vocational-technical schools) was intriguing, and in the summer of 1971 a contract was awarded to the South Dakota State Department of Health by the Division of Associated Health Professions, Health Resources Administration. This contract transformed the project from thought to inception, and the state health

manpower coordinator was assigned the responsibility for achieving the seven objectives delineated in the application:

1. To gain the participation in planning activities of the various health manpower training programs in South Dakota.
2. To organize a Health Manpower Council for the entire state of South Dakota.
3. To promote communication among the various health manpower training programs and the individuals representing the various health occupations in South Dakota.
4. To identify and describe the health manpower training programs, educational resources and health training facilities in the state and to encourage cooperative arrangements among these groups.
5. To define the areas of basic commonality among the various health occupation training programs.
6. To attempt the development of a core curriculum or core curricula for health manpower training on a statewide basis.
7. To encourage the transfer of course credits among the various health training institutions in the state.

II

Patience And Persistence: Mandatory Virtues

"We have met the enemy and he is us."

--"Charlie Brown" [Schulz]

Changing traditional practices in any industry, art or profession can be a difficult, often frustrating process. Entrenched practitioners understandably are protective, wary, jealous of perogatives and skeptical of innovation.

Accordingly, the introduction of the core curriculum concept to the health training institutions in South Dakota was greeted by some as an unnecessary and unworkable "rocking of the boat" which hitherto had floated along seemingly without too much trouble. As a result, when the state health manpower coordinator made his very first visit to a teaching institution to explain the proposed endeavor, he was told politely but firmly that--for a variety of reasons (and excuses)--the project would never "get off the ground."

This initial negative reaction served as a challenge rather than a deflating blow, and as the interviews progressed from one institution to another, it became obvious that for the concept to be broadly accepted, an extended period of communication, education and "soft sell" would be necessary to overcome natural reticences. The result was a fundamental policy decision: **No attempt would be made to apply any kind of pressure or authoritarian demands on institutions or individual educators.** For the system to work effectively, it would have to evolve strictly on the basis of merit and not leverage.

When President Gerald R. Ford spoke to the United States Congress on August 12, 1974, he promised a relationship based on "communication, conciliation, compromise and cooperation." With those four

words he could well have been describing the process by which the South Dakota Core Curriculum Project was patiently nurtured into existence. Throughout the latter half of 1970 and much of 1971, the coordinator laid the groundwork for broad participation by personally visiting all 26 of the institutions in which health career courses were taught, meeting the directors and faculty members, obtaining facts about the various programs and urging appointments of representatives to the Health Manpower Council.

The latter body was the vehicle by which the project leaders planned to foster democratic input and decision-making. The HMC—as the council quickly came to be known—was formed on the basis of one representative from each of the state's health manpower training/education programs which resulted in the award of certificates, diplomas, degrees or other official credentials. An educational institution or health facility with more than one program was entitled to representation for each separate training activity, and each council member was granted one vote. (The HMC also had other members from health groups, governmental agencies, etc.)

Furthermore, it was stressed from the beginning that the HMC would be strictly a voluntary association with neither the authority nor responsibility for trespassing on institutional perogatives. For example, an institution would be able to reject any of the council's recommendations or to accept one, a few or all of them. Moreover, a program could withdraw its membership at any time.

Though the preliminary contacts required a great amount of time, travel and patient persuasion to give the Health Manpower Council a realistic opportunity to function successfully, a positive response began to develop across the state. [In describing his discussions with some of the more cautious educators, the director said, "There were many times when I had to idle my motor when I felt like stripping my gears."] Support for the concept ranged from great enthusiasm to a "what have I got to lose" testing attitude. In time, **all** appropriate training programs agreed to participate in developmental meetings of the HMC, and the stage was set for the next phase of the project plan.

Meanwhile, the director had not limited his informational contacts to educational institutions. He explained the philosophy to representatives of such organizations as the State Board of Regents, the Division of Vocational Education, the State Planning Agency, the South Dakota Medical Association, the State Nurses' Association, the Board of Nursing, the South Dakota Hospital Association and various other health-oriented agencies and groups. State legislators and other private citizens with particular interest in the health-care field were also contacted. The purpose for these preparatory visitations, of course, was to achieve across-the-board awareness of the project and its aims among all organizations and individuals who would or should be involved. The work was time-consuming and tedious, but it paid off when the HMC was activated and the task of defining and building a core curriculum actually began.

As one staff member put it: "According to the old adage, you supposedly can lead horses to water, but it's difficult to make them drink. In this case, frankly, we also had to persuade them to come to the tank so the **real** imbibing could take place."

III

Defining Core Curriculum And Tackling The Problem

"I refuse to accept the conclusion that health professionals, who in so many instances share common service roles and responsibilities for patient care, cannot share similar learning experiences in their academic preparation."

–Joseph Hamburg, M.D.

To alleviate fears of educators and certain health professionals, it was important right from the beginning to emphasize strongly that the South Dakota core curriculum was NOT to be "planned in advance" by some higher authority and that it was NOT to be designed to require all faculty members in all schools to teach identical courses like pedagogical robots.

Conversely, a major aim of core was and is to retain the different nuances and presentations of individual instructors while at the same time providing bridges to connect the various programs and schools for the ultimate benefit of the student if and when he needs or wants such a span in pursuit of his personal career goals which may very well change as he broadens his experience.

In activating the core curriculum project, there was considerable concern about proper juxtaposition of cart and horse. Accordingly, it was decided that the project staff--in the role of a "neutral catalyst"--should provide only limited direction at the outset in order to assure Health Manpower Council members that the ultimate product would **truly** be their work. It was emphasized that they would not be called together merely to rubber-stamp a preconceived package, but that they would indeed create the core curriculum themselves.

The major problem, of course, was to inventory all the health-career programs in the state, to break them down in terms of "tasks, skills, knowledge and attitudes," and then to determine the commonalities around which a core curriculum could be built. To prepare for that obviously extensive and detailed job, the first general meeting of the HMC was held on September 27, 1971, to chart the course for action.

More than 70 representatives from educational institutions, health-care facilities and related agencies throughout South Dakota were in attendance. A panel of speakers discussed the concept of core curriculum and career mobility from a variety of angles:

+ the need to seek economies and efficiency in the training process and to avoid overlapping;
+ the importance of both lateral and vertical mobility to retain capable personnel in the health field and to sustain their enthusiasm for their work;
+ the advantages of cross-fertilization of ideas by exposing educators and students from different fields to one another;
+ the desirability of bringing health manpower development under some form of planning apparatus rather than permitting programs to proliferate with little relationship to need or coordination with other elements of the health-care team;
+ recognition of the growing demands of consumers and students for more than lip service

regarding the health delivery system and the preparation necessary to become a productive part of that system.

The enthusiastic interest in further involvement in the core curriculum project evidenced by participants at the first HMC meeting pinpointed an impending functional problem. It was obvious that the council would be too large and unwieldy for efficient work sessions unless it were broken down into smaller units. Consequently, eight subcommittees were designated to accomplish the following objectives:

1. Obtain detailed course descriptions of each course offered in the curriculum of each individual health manpower training program in South Dakota;
2. Define the areas of basic commonalities among the various health occupation training programs; and
3. Report back to the Health Manpower Council all findings and recommendations to be used in the development of the training/education content of the core curriculum.

(Because members of the HMC subcommittees were busy people whose commitment to the core curriculum project was primarily voluntary, it was decided later to supplement their work with research by project staffers and paid consultants in order to avoid a considerable time lag and the resultant loss of momentum.)

In the meantime, the project staff also completed the inventory of health manpower training programs in South Dakota and published a directory (see Appendix A for summary chart). Additionally, in preparation for the next phase of the developmental process, contact was made with the Allied Health Professions Project conducted by the Division of Vocational Education at the University of California at Los Angeles. The purpose of the liaison, of course, was to capitalize on the knowledge and experience already gained by the federally funded AHPP relative to core curriculum. (AHPP representatives later contributed generously to workshop sessions of the South Dakota project.)

The state coordinator continued efforts to broaden participation and interest in the program. The South Dakota League for Nursing requested the project office to provide materials on health careers for a display booth at the 1971 South Dakota State Fair, and an estimated 20,000 people viewed a colored slide presentation and picked up informative brochures. In December, 1971, the details of the core curriculum activity were presented at a meeting of deans and/or vice presidents for academic affairs from the state's institutions of higher education, both public and private. Because of their key roles in curricular affairs, it was considered extremely important to keep them informed of the philosophy, rationale and progress of the project.

Numerous skeptics had predicted that South Dakota's attempted core curriculum for allied health and nursing education would never get beyond the preliminary fawboning stage; by mid-1972, however, the project not only was alive and well, but it was ready to move from theory to reality.

IV

Two Vital Elements: Task Analysis And Performance

"The possession of scientific knowledge is of little value in pursuing an occupation. It is what you can **do** *with it that counts."*

–Miles H. Anderson, Ed.D.

Because allied health and nursing occupations encompass such a broad spectrum of knowledge and task proficiency, determination of the commonalities among the occupational specialities necessitated the segregation and analysis of each of the hundreds of training/education requisites involved.

It should be pointed out here that the South Dakota project ran into numerous semantic hurdles and inter-occupational prejudices–as was expected–and these had to be considered and respected in order to keep the program from degenerating into a giant nit-picking contest.

Baccalaureate program representatives objected to the use of "training" as opposed to "education" in describing their teaching efforts; nurses balked at being included under the "allied health occupations" label; concern was expressed by some educators that a health-career core curriculum on a statewide level would be too task-oriented, too "vocational;" and vocational instructors reacted to the inclusion of what they considered to be academic non-essentials.

It became the responsibility of the project coordinator and his staff members to mollify the diverse-thinking, often vociferous individuals sufficiently enough to get them together to exchange views and seek compatabilities rather than to perpetuate and expand differences.

There was another factor which also required kid-glove treatment. Most HMC members were impatient to move ahead. Many wanted to discuss implementation even before the theory was clearly established. Visualization of the concept and its application varied greatly among participants, all of which hampered adherence to the plan for a systematic stage-by-stage development. "Too many of us wanted to look down the wrong end of the telescope" was the way one council member described the situation.

A public relations approach prevailed, however, and council members were brought together for their first major workshop on September 14-16, 1972, at a Black Hills lodge where they were somewhat cloistered and freed from distraction. The purpose of the meeting was to introduce the HMC to the next phase in the evolution of the core curriculum: the inventorying and analysis of the tasks involved in the various health-care occupations, and preparation of behavioral or performance objectives to govern the teaching of skills and knowledge necessary to perform those tasks.

With experienced consultants conducting the work sessions, participants were made aware of (and actually practiced) a standardized system of task analysis and objectives-writing. They were reminded that an objective is the desired measurable performance expected of a learner and that it is not an end in itself but must lead to a student-oriented goal. Furthermore, it was emphasized that with clear-cut objectives it was possible for–

1. **Teachers** to determine the effectiveness of their instruction through student progress;
2. **Students** to know exactly what is expected of them;
3. **Administrators** to evaluate teachers by observation, and
4. **The Public** to judge the effectiveness of the educational system it finances.

While the workshop was not directed specifically to the building of a core curriculum for South Dakota, it was one more important step in the preparation of HMC members to tackle the work realistically and in concert–like teaching musicians to play the basic scales before exposing them to a symphonic score.

One of the consultants–Miles H. Anderson, Ed.D., director of the UCLA Allied Health Professions Project–capsulized the workshop presentations thusly:

"Skills are the ability to perform occupational tasks, and knowledge is the possession of and ability to use scientific and technical facts. Attitudes are the sum total of the opinions, beliefs and feelings we hold regarding our work, our fellow workers, our patients, our employers and our environment in general.

". . . a task is the performance of a series of physical, mental and attitudinal acts by means of which one achieves a specific objective. To be teachable, a task must be specific, precisely stated and free from ambiguity that results from omission of important details . . . task-oriented instruction emphasizes helping people do something useful for themselves and for society with what they learn. **It does not mean we are making unthinking robots out of them or that we want to eliminate principles, concepts, theory, basic science and the ability to think**. Thinking is a task; solving a problem is a task. Task-oriented instruction helps the student to learn the basic science and technical knowledge related to an allied health occupation, and it helps him to learn how to use it to advantage in his work.

". . . task-oriented instruction enables the student to learn more, in less time and with greater retention [and that is what] occupational education in the allied health field is all about."

The next step in the progression would be to apply the various techniques of course dissection, task analysis, writing of objectives, etc., to the realities of health manpower training/education programs existing in South Dakota. Though there were still expressions of impatience as a result of the theoretical tone of the first general workshop, a growing willingness on the part of most HMC members to work toward the core curriculum in an organized, systematic manner was clearly evident when the meeting adjourned.

V

A Second Workshop: The Core Emerges

"Nothing else in the world . . . is so powerful as an idea whose time has come."

–Victor Hugo

The South Dakota Core Curriculum Project got down to "nuts and bolts" deliberations when a second major workshop of the Health Manpower Council was convened at another relatively isolated Black Hills lodge on May 22-25, 1973. (While two or three members apparently favored meeting in one of the more populated cities in the eastern portion of the state, the general concensus was that freedom from telephones, student conferences and other disruptions was well worth the extra mileage and other logistical

problems.)

Eighty participants attended the four-day conclave which was organized into five smaller work groups. Consultant expertise supplemented staff and council input as the program was designed to prepare a preliminary entry level core curriculum for South Dakota's health-related occupations.

Before the HMC began its concentration on core content, however, the council first clarified the definition, rationale and objectives of the curriculum they proposed to develop. Members agreed that, operationally, the core should be modeled as two integrated but dissimilar divisions: a **training (vocational/technical)** core derived from tasks, skills and knowledge directly related to employment in the health field, and an **educational** core derived from academic disciplines.

After lengthy discussion, it was further agreed that the rationale for the project would include the following 11 points.

1. To enhance teaching efficiency and economy by structuring a foundation of courses which can be applied to a wide spectrum of careers.
2. To provide uncommitted students with an educational experience which will assist in their choice of a career and will be applicable to that career.
3. To allow the student to synthesize and correlate learning experiences.
4. To permit greater program flexibility and adaptability.
5. To provide greater interaction among a variety of students.
6. To prevent unnecessary duplication of subject matter, supplies, equipment, space, faculty, etc. (economic use of time, money and energy).
7. To simplify administration within and between agencies.
8. To promote an articulated sequence of courses.
9. To provide a basis for non-teacher-biased challenge exams.
10. To provide standardized content.
11. To enhance career mobility.

The 11 points led directly to the two-part objectives which the HMC framed and adopted. These goals postulated that, through the core curriculum, a student would ultimately possess:

1. A solid foundation of knowledge and skills on which to build occupational mobility in health, and
2. A solid foundation of theoretical knowledge which would permit him to continue an upward academic pursuit rather than having to start over.

Because workshop participants included both clinicians and academicians, the development of the entry level core curriculum was initially divided into training and educational segments to make optimum use of the assembled talent. Also there was some effort made to balance the known pro-core and anti-core members to prevent domination of the discussions by those with strong opinions one way or the other.

The various groups--each with a consultant as moderator were provided with a variety of curriculum resource materials and charged with: (a) formulating potential content for both training and education cores, (b) cross-checking the two to determine commonalities and overlap, and (c) identifying skills, tasks and knowledge necessary to fill in the voids which might occur through oversight in such a concentrated effort.

The members worked diligently throughout the session and became so involved in the seriousness of the assignment that they took more time than had been estimated; consequently, they were unable to complete their total mission. Instead, they proceeded as far as they could in the development of the parallel curricula and recommended refinement in future meetings or by smaller committees. On that basis the workshop was adjudged a productive success.

Of course, there were some shortcomings as indicated by participants' evaluation sheets. A few apparently did not grasp the general philosophy at the outset and were therefore hampered in their contributions. There was some objection to task-orientation, semantic jousting, lack of resource material and length of sessions. On the plus side, council members generally were pleased with the openness of the discussions, the encouragement of input from all conferees and the performances of group leaders.

As might be expected, though, not everyone left the meeting totally convinced of the workability or acceptability of a statewide core curriculum. There were many questions left unanswered (or even unasked), and the varying viewpoints of academicians and clinicians were not completely resolved. However, the positive responses to the question of the ultimate value of the project and its final product greatly outnumbered the negative, and **all** HMC members evinced a willingness to participate further in the refinement stage.

As the pace of activities increased, more staff direction and administrative attention-to-detail were re-

quired, so as a consequence, an associate director [Wayne M. Gildseth, Ph.D.] was added to the program in the summer of 1973. Under his guidance, five subcommittee meetings were scheduled during the latter months of 1973 and the first two months of 1974 to follow up on the accomplishments of the second large workshop. These smaller groups (approximately 20 participants per session) were able to proceed more efficiently with the refinement process--improving the content of the primary and secondary cores and revising and editing the measurable (performance) objectives of each curriculum element.

In general the subcommittees followed the methodology established in the May, 1973, workshop by consultants Jerome Epstein, M.A., Howard Taub, M.T., and Lucile A. Wood, R.N., M.S., of Curriculum Development Specialists, Encino, California, together with Thomas E. Freeland, Ph.D., Dean of the School of Health-Related Professions, University of Mississippi.

The subcommittees--augmented by staff and consultant input--reviewed the overall concept and recommended that the core curriculum be divided into primary and secondary segments as follows:

Primary: That collection of tasks, skills, knowledge and attitudes which is fundamental, foundational and common to **all** South Dakota health manpower training/education curricula, and

Secondary: That collection of tasks, skills, knowledge and attitudes which is fundamental, foundational and common to **more than one** type of health manpower training/education curricula in South Dakota, further divided into six subject areas:

1. Anatomy and physiology.
2. Chemistry.
3. Interpersonal relationships.
4. Microbiology.
5. Nutrition.
6. Public health and health-care delivery.

Despite personal biases because of vested interests and involvement, subcommittee members approached their task professionally, earnestly and unprejudicially. The primary core was reworked to the best possible state of development, and topical outlines and measurable objectives for the secondary level were prepared.

In addition, a minimum degree of importance was established for inclusion of curriculum items (both primary and secondary) in the core content. The subcommittees' objectives included the rating of each item in terms of **commonality** (measure of importance to a specific health education program) and **universality** (measure of importance to health education in general). Also, potential core inclusions were to be evaluated subjectively in regard to the depth of coverage or intensity with which the individual item should be taught. The rating scale ranged from "cursory" through "introductory" and "intermediate" to "in depth".

Out of all the hundreds of man-hours of debate and deliberation, a final product was beginning to emerge. The patience and persistence gave evidence of paying off, but it was not always easy along the way, with an occasional clash of personalities and the foot-dragging of a skeptical few. There was also a dramatic incident during one of the subcommittee meetings which momentarily caused the health manpower director and his staff associates to wonder if there was a conspiracy against their efforts. A large easel pad containing the updated secondary core content for public health and health-care delivery was left overnight in the conference room, and someone (a janitor or a core curriculum antagonist?) absconded with it. The concentrated labors of one full day were involved in the theft, but subcommittee members rose to the challenge and with the help of their own personal notes, they were able to reconstruct the stolen data. (The loss of time, however, made it necessary to complete the evaluation process by mail.)

During the final subcommittee meeting, participants recommended that the core material--as amended, corrected and evaluated--be sent to all South Dakota health training/education representatives for still another polishing before the convening of a third full-scale HMC workshop.

VI

The Continuing Refinement Process

"Trifles make perfection, and perfection is no trifle."

-Michelangelo

It has been said that the South Dakota Core Curriculum Project charted a narrow course between two old conflicting 'axioms': "Many hands make light work" and "Too many cooks spoil the broth." Largely through "human engineering," the Health Manpower Council members--widely diverse in their training/education philosophies--were kept interested and enthused enough to pursue the core concept at least to, if not over, the brink of implementation.

Following the subcommittee recommendations, all of the core materials were organized and duplicated by the organizational staff and sent to the health manpower training programs throughout the state. In addition, copies went to institutional administrators and to instructors who might ultimately be teaching portions of the core curriculum. A number of changes were suggested as a result of this review process, and so a third major workshop was scheduled in the Black Hills for May 29-31, 1974, to determine the acceptability of the proposed alterations and to discuss possible adoption and implementation of some or all of the developed core.

Seventy participants responded from a broad base of cooperating institutions as the stage-by-stage developmental process continued. While a variety of activities and objectives were planned (including consideration of core instructional materials, challenge examinations, the career ladder aspect and implementation hurdles), council members again worked overtime on core refinement which, in turn, limited other deliberations. As a result, however, out of the workshop came a substantive product which, if it were not adaptable in every instance, was certainly worthy of serious consideration by all of the state's training/education programs because of the caliber and scope of input invested in the birthing. The refined primary and secondary core curricula may be found in Appendix B.

It was the unanimous concensus, of course, that the core curriculum as developed should not be a static, unelastic regimen, but that it should undergo continuing modifications and upgrading to adapt to evolving needs. The Health Manpower Council was recognized as a logical vehicle for on-going refinement and, additionally, as a practical and beneficial forum for exchange of ideas and the solution of other problems in the preparation of students for health-related careers.

In addition to bringing the core curriculum up to the highest possible level of development, the HMC discussed the controversial subject of semester credit hours as related to the core. The majority opinion of the voting members as it finally emerged was "that although it was the prerogative of each academic credit-granting institution to determine the amount of credit it might wish to grant a student who has demonstrated competency in a given core curricular area (either by taking the course at that institution or via the equivalency or challenge examination route), it is also the prerogative and probably the responsibility of the Core Curriculum Project to **recommend** semester credit-hour values which it feels are reasonable and justified for each of the core areas."

Accordingly, a plurality of council members supported the following **suggested** semester credit-hour allocations:

Primary core curriculum 6

Secondary core curriculum:
- Anatomy and physiology 4
- Chemistry 8
- Interpersonal relationships 2
- Microbiology 4
- Nutrition 3
- Public health and health-care delivery 3

The commitment of a well studied, much edited core curriculum to paper was in itself a major achievement, but what its ultimate impact on the health manpower situation in South Dakota will be is still a matter of conjecture. Whether it will be widely accepted for practical use–even by its staunchest proponents in the training/education field–remains to be seen.

Despite continuing assurances from staff members that there would be no governmental interference in established programs and that participation would remain strictly voluntary, a feeling has persisted among a few institutional representatives that, sooner or later, some sort of dictum to interfere with academic freedom would be forthcoming. This has been a nagging problem for the project director at all times. Staff visits to various program sites were rumored to be "spying missions" to see what was being taught and how. One administrator frankly expressed the view that once a core curriculum was developed, institutions would be forced to conform to it or lose federal funds. There were also instances when information about the core project was not shared with all faculty members who might have been interested, but this apparently was due more to communications deficiencies rather than any effort to limit participation.

These attitudes and conditions are mentioned, not so much as negative factors, but to indicate the various stumbling blocks which the project has encountered–and undoubtedly will continue to face.

VII

Implementation: Proof Of The Plodding

"If struggling with the core concept does nothing more than make us look carefully at what we are trying to achieve with our present teaching program, it will have served a most useful purpose."

–Joseph Hamburg, M.D.

At the third major workshop, Tom Kilian, Ph.D., Secretary of the South Dakota Department of Education and Cultural Affairs, emphasized to the Health Manpower Council that to achieve the goals of core curriculum, "a strong sense of commitment and purpose" would be required.

Metaphorically, it was one thing to invent the airplane and another to put it to practical use. The same is true of core curriculum. It was realized full well by those involved that implementing the core into existing, historically successful programs–many of them with jam-packed and relatively inflexible schedules–would be (like the airplane's use) a slow, evolving process. In one of his many talks to interested groups, the director capsuled the project's developmental mission and on-going role:

"Our major goal has been to design a multifaceted, streamlined core curriculum which will serve as many of the health training/education programs in South Dakota as possible and to provide opportunities for lateral and vertical mobility for students frustrated by repetitious training and time-consuming courses. Side issues include the transfer of credits and/or experience, challenge examination possibili-

ties, standardized performance testing, the development of teaching materials and the requirements of continuing education.

"The core curriculum has not been imposed by higher authority but is a democratically derived product of representatives of all affected programs in the state, none of which are obligated to accept all or any part of the results. It should be stressed again that the intent of the project is not to make all institutions teach identical content, but at the same time it is firmly believed that the core curriculum and career ladder concept can be implemented in whole or in part with adequate program flexibility and enough room for creative innovation to permit different educational philosophies to coexist.

"Even after the long, trying pregnancy, I continue to be as optimistic as ever about the possibilities of core. I realize, of course, that various modifications and compromises will be required to achieve implementation in the various individual programs, but it is hoped that those compromises will not be so great as to destroy the rationale and educational creativity embodied in the concept. While I can sympathize with legitimate deterrents to rapid infusion of the core in certain cases, I find it difficult to accept fear of change, stubborn resistance, self-serving interests and unwillingness to cooperate with other programs as defendable excuses to avoid serious consideration of the core approach as a potential solution to South Dakota's health manpower problems."

Even before the refined version of the core curriculum was completed, several program representatives informed the director that elements of the core would be adopted by their respective institutions in the 1974 fall term. This was particularly gratifying since such quick action had not been contemplated and because there was still a great amount of work remaining to be done in the areas of career ladder expansion, challenge examination development and instructional material research and acquisition.

While structuring and refinement of the core curriculum itself received dominant attention, work was begun concurrently on specific career ladder objectives. A consultant was retained to determine the feasibility and format of a mobility pattern involving certified laboratory assistant, medical laboratory technician and medical technologist programs. A similar study was undertaken in the nursing field, encompassing licensed practical nurses, associate degree registered nurses, diploma degree registered nurses and baccalaureate degree registered nurses. Ascertaining whether or not there is a need for a South Dakota-based master's degree program in nursing was also included as a goal of the latter research assignment.

As an expansion of the similitude mentioned previously in this chapter, the practical use of the airplane was hurried by the demands for speedier transportation and the military needs of World War I. Possibly the implementation of the core curriculum will receive similar impetus from the demands of frustrated students and the vital need to seek solutions to the rising costs of education and health care.

VIII

A Summary:
The End Of The Beginning

"If we believe men have any personal rights at all as human beings, they have an absolute right to such a measure of good health as society, and society alone, is able to give them."

–Aristotle

All planning for health in South Dakota is directed toward the basic mission of SDRMP-CHP: "To improve the quality of care throughout the state and to assure the accessibility of that quality care to **all** citizens at the most reasonable cost possible."

Accordingly, the Core Curriculum Project is not an end in itself but must be related ultimately to the betterment of health care in South Dakota. Provision of properly trained manpower to deliver that quality health care is a major requisite to the fulfillment of the SDRMP-CHP mission. In turn, tying together and coordinating the proliferating and diverse training/education programs to provide the needed manpower efficiently and economically cannot be overlooked in the overall scheme.

In the core curriculum concept, the needs of the student are placed ahead of those of the educator. Three elements are included in the philosophy: (1) the core itself which features a uniformity of course blocks among various programs to permit inter-school transfers without loss of credit; (2) the career mobility arrangement which provides for health-career courses in blocks or steps so students can upgrade themselves professionally without starting over or repeating previously studied material; and (3) the challenge system which calls for equivalency or proficiency examinations to permit students to receive credit for competency in the subject matter of a particular course without having to take the course.

In its most idealistic application, the core curriculum would make it possible for an individual to move from a licensed practical nurse category to that of a physician with a minimum of disruptions or repetition. Mobility possibilities or combinations beneath that utopian example would be numerous and varied, and hopefully the loss of trained personnel in the health field because of dissatisfaction with personal progress could be minimized.

The South Dakota Core Curriculum Project was funded and activated as a pilot program—the first of its kind and scope. Because of the prototype nature of the endeavor, its results have been unpredictable and its longevity uncertain, but three years after an embryonic beginning, the project has survived its growing pains, has matured without crippling infirmities and promises to leave a few productive offspring who could very well bring new blood to some aging education practices.

Not all members of the Health Manpower Council were convinced of the practicality of core, and though there was virtually unanimous agreement that the concept was worthwhile in theory, a few representatives were equally as convinced that the core curriculum simply would not work in **their** programs. There was a tendency on the part of some participants to think and react only in terms of their own interests or specialties, and this made it difficult for them to grasp the broad mobility features of the

philosophy. In general, though, discussions in the various workshops were frank, intelligent, positive and professional. Anyone who had something to say--critically or constructively--was given the opportunity. In addition, the meetings and the project itself were evaluated in writing by the council members, and a sampling of their comments follows:

"The opportunity to interact with others in the health education and delivery system in South Dakota has been a great experience. We will soon be implementing a portion of the secondary core on an experimental basis."

"Are the science people (especially chemistry) really listening to the rest of the group? . . . The majority are male and dominant in their approach."

". . . there has been a lot of give and take between the college and professional representatives."

"In the collegiate setting, I hope that [the core curriculum] doesn't necessitate an unlearning or relearning process."

". . . the group meetings are of value beyond measure in uniting the various and varied programs under a common set of values and goals."

[Core is] "one of the exciting things which has happened in the health field in South Dakota."

"If the core curriculum concept was accepted and uniform educational standards adhered to, the problems of transfer students would be greatly reduced."

"Personally I do not feel that a primary core has a place in our college curriculum. It is a hodge-podge of information."

"It would appear beneficial to everyone involved if persons entering health-care programs could build upon completed courses and obtain advanced degrees or alter academic pursuits with a minimum of lost credit."

"I do not see the task-oriented core as being at all beneficial for a nurse; in fact it would be a detriment to the baccalaureate nurse."

"There were too many people [at the workshops] not trying to develop a core but trying to impress each other with their background, status and intelligence."

". . . let's get this core implemented. . . it could be the best thing done for [health] education in the last 20 years."

Regardless of the final outcome, South Dakota's statewide Core Curriculum Project has pointed the way to a new cooperative, innovative and integrated approach to health-career training/education. The old traditional "go it alone" attitude is being eroded by rising costs, more realistic planning for manpower needs and the insistent demands of students. If, in the end, the concept proves its validity, the ultimate beneficiary will be the health-care consumer--and that, after all, is or should be the overriding goal.

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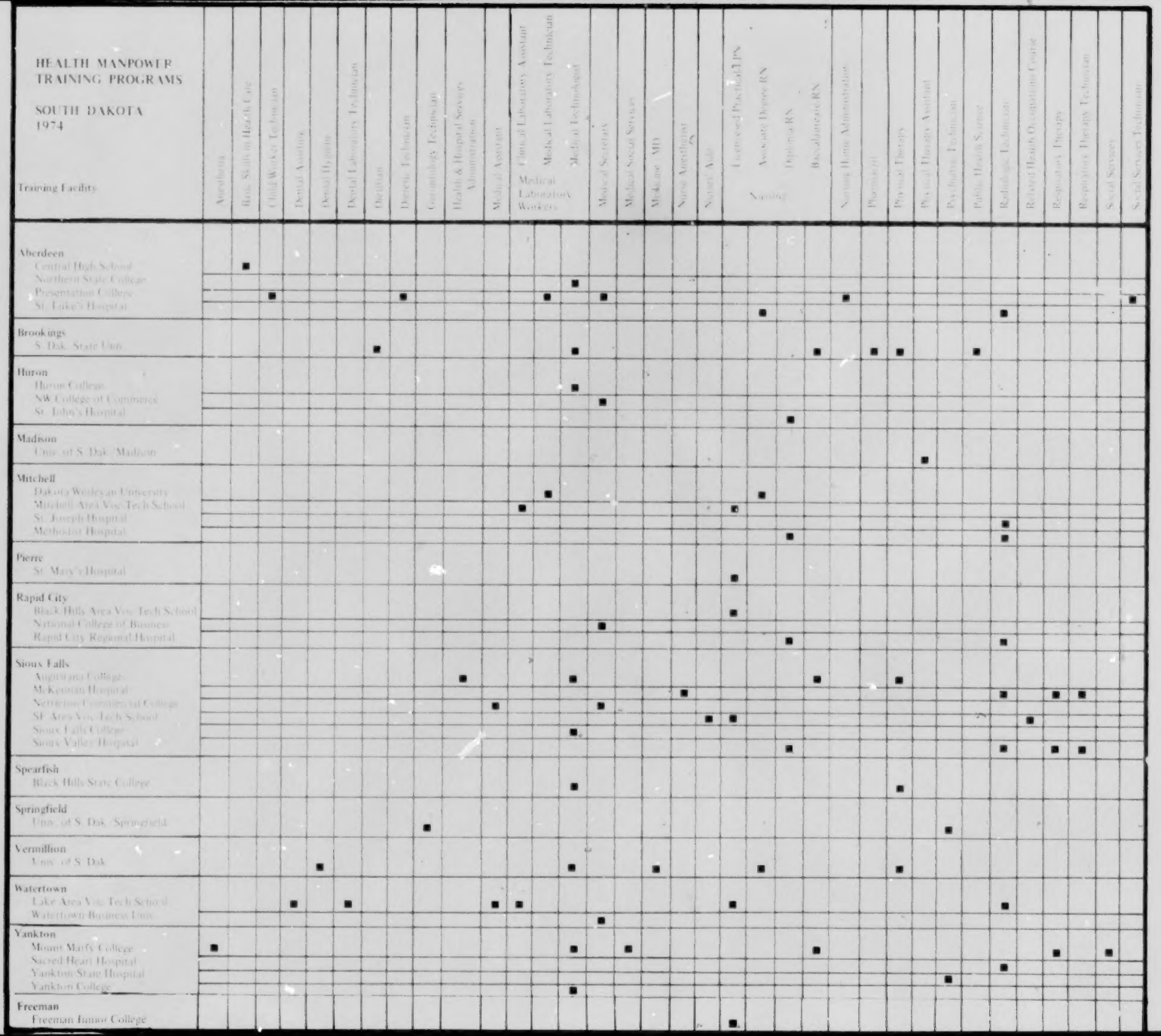
APPENDIX A

HEALTH MANPOWER TRAINING PROGRAMS

SOUTH DAKOTA
1974



APPENDIX B

Topical Outlines
and
Measurable Objectives
for the
Primary and Secondary
Core Curricula

Primary Core Curriculum: 20

Health Care Delivery System
Introduction to Health Science
Emergency Medical Care

Secondary Core Curriculum: 39

Anatomy and Physiology
Chemistry
Interpersonal Relationships
Microbiology
Nutrition
Public Health and Health Care Delivery

Topical Outline	Measurable Objectives
I. Health Care Delivery System	The student will be able to:
A. Definition of Health 1. Levels of Wellness (Homeodynamics)	1. Explain the World Health Organization concept of health. 2. Relate in his own words his concept of health by demonstrating in writing his values about health.
B. Health Care Personnel 1. Vocational Opportunities 2. Health Care Team Concept	3. In a short paragraph, briefly explain the core curriculum-career ladder approach to health education. 4. Given a list of health occupations and their related job descriptions, identify by matching the various occupations with their job descriptions. 5. Given a list of health occupations, identify (define) by listing in order of increasing education and degree of responsibility the occupational level within each health care occupation. 6. Given a list of health care team members, describe briefly their role in relation to preventative, therapeutic, and rehabilitative health of an individual.
C. Organizational Structures of Health Care Facilities 1. Types of Facilities a. Hospitals b. Nursing Homes c. Clinics d. Others (Health Related Public or Private Agencies)	7. Given the following list of health care facilities, identify by writing a short statement of no more than 50 words the primary services of each: a. hospital b. nursing homes c. clinics d. medical centers e. a private health agency f. a public health agency
D. External Controls of Organizations and Individuals 1. Legal Aspects a. Responsibilities b. Protection c. Patient Rights	8. Define the term "law", specifically as it applies to the health worker. 9. List the historical sources for the law and specifically "medical" law. 10. Demonstrate your knowledge of the rights of the individual under the law and how these rights might be violated if consent and medical orders are inadequate. 11. Indicate in given situations when an act can be interpreted as malpractice or negligence. 12. Distinguish civil from criminal law. 13. State the need for accurate and complete medical records. 14. List several basic rules to follow for the prevention of litigation.
2. Ethical Aspects	15. Define ethics as applied to health care workers. 16. Differentiate between legal aspects and ethical considerations.

Topical Outline	Measurable Objectives
	17. Discuss the necessity for and utilization of ethics in hospital situations.
	18. Apply ethical behavior guidelines in judging appropriate choices of action in eight hypothetical, health-related situations.
3. Accreditation, Certification and Licensure	19. Explain the reasons for licensure or certification of health workers.
4. Sources of Funds	20. List (or match) a short description of sources of funds which might be used to pay for health care services in the following situations: a. child with crippling disease such as C.P. b. aged individual with broken hip c. maternity and child care d. family maintaining health e. others
II. Introduction to Health Science	
A. Introduction to the Human Anatomical System 1. Anatomical Organization a. Cells, Tissues and Organization	21. Locate the cytoplasm, nucleus, cell membrane and mitochondria on a diagram of a cell.
	22. Define orally and/or in writing the terms mitosis and meiosis.
	23. Name at least two inorganic and three organic substances common to all protoplasm.
	24. Identify by name, six characteristics of protoplasm.
	25. Distinguish between intracellular and interstitial fluids.
	26. Using his own words, describe in writing the processes of: diffusion, filtration and osmosis.
	27. Define in writing the term tissue, and name four main tissue types.
	28. Define the term organ.
	29. List eight of ten organ systems.
	30. Name the two large body cavities.
	31. Name the directional terms used in anatomy.
	32. Name the planes of the body.
2. Integument (Skin and Mucous Membrane) a. Structure b. Function	33. Given an unlabeled diagram, the student will correctly identify by labeling the following: pigment granule — epidermis dermis — subcutaneous tissue root of hair — sweat gland sebaceous gland
	34. Identify at least two functions of the skin.
	35. Describe at least two characteristics of mucous mem-

Topical Outline	Measurable Objectives
	brane; identifying by name three body areas where mucous membranes are found.
3. Skeletal System a. Structure b. Function	36. List five major functions of skeletal system.
	37. Name the two chemical elements most necessary for bone formation, and identify common sources of each.
	38. Given an unlabeled diagram of a human skeleton, correctly locate the following: skull, sternum, clavicle, humerus, radius, ulna, pelvis, femur, patella, tibia, fibula, scapula, ribs, vertebral column, parietal, frontal, occipital, temporal, mastoid process, maxilla, mandible, sphenoid, ethmoid, carpals, metacarpals, phalanges, greater trochanter, tarsals, metatarsals
	39. Be able to designate by name and anatomical region the several sections of the spinal column.
	40. List three types of joints, and give an example of each by indicating the movement involved.
4. Muscular System a. Structure b. Function	41. List by name the three types of muscle.
	42. Define the following terms: tendon origin belly of muscle insertion
	43. Describe in writing four major functions of the muscular system.
	44. Describe in writing how muscles produce mechanical movement.
	45. Given a diagram, label the following muscles: deltoid, pectoralis, triceps, hamstring, trapezius, gluteus maximus, quadriceps femoris, biceps, external oblique, gastrocnemius, sternoclidomastoid, latissimus dorsi, gluteus media
5. Nervous System a. Structure b. Function	46. Name two major subdivisions of the nervous system.
	47. Given an unlabeled diagram of a neuron, label correctly three main parts of the neuron.
	48. Define in writing, using your own words, the terms recep-

Topical Outline	Measurable Objectives
	tor, synapse, effector, reflex arc, dendrite, axon and myelin sheath.
	49. Given an unlabeled diagram of the central nervous system, correctly locate the following: meninges, cerebellum, cerebrum, medulla, spinal cord and spinal fluid.
	50. Using your own words, describe in writing a major function of the: meninges, cerebellum, cerebrum, medulla and spinal cord.
	51. Identify the general function of the autonomic nervous system.
	52. Identify the major function of cerebrospinal fluid.
6. Sensory System a. Structure b. Function	53. Given a diagram of the eye and its associated structures, label: conjunctiva — sclera choroid — retina ciliary body — iris lens — cornea aqueous humor — vitreous humor pupil
	54. Given a diagram of the ear, identify by labeling the following structures: pinnae — external auditory meatus tympanic membrane — malleus incus — stapes eustachian tube — cochlea semicircular canals
7. Circulatory System a. Structure b. Function	55. Name the two major components of blood.
	56. Describe in writing the general function of the blood.
	57. Name three formed elements of human blood, and describe their functions.
	58. Given a diagram of the circulatory system, identify by labeling the following arteries: aorta — pulmonary carotid — subclavian brachial — radial femoral — coronary iliac
	59. Identify the average number of white cells and red cells per cubic millimeter usually considered normal for an adult.
	60. Differentiate between thrombus and embolus.
	61. Given a diagram of the circulatory system, identify by labeling the following veins: jugular — subclavian superior vena cava — inferior vena cava basilic — cephalic median — saphenous vein
	62. Given a diagram of the heart, trace the path of the blood.

Topical Outline	Measurable Objectives
	63. Given a diagram of the heart, label the following structures: right and left atria right and left ventricles mitral valve tricuspid valve
	64. Name the covering of the heart and the three layers of the heart.
	65. Name four common blood groups.
8. Respiratory System a. Structure b. Function	66. Using your own words, describe the mechanics of breathing.
	67. Given a diagram, identify by labeling the following structures: trachea — pharynx bronchi — lungs larynx — epiglottis
	68. Describe the three functions of the nose in the breathing process.
	69. Describe the structures and functions of bronchioles, alveolar ducts and alveoli.
	70. Name the compound responsible for oxygen transport to the tissues.
	71. Define the terms vital capacity and normal respiratory rate.
9. Digestive System a. Structure b. Function	72. Name four types of teeth, and describe the function of each.
	73. Given a diagram of a tooth, correctly identify by labeling the following: enamel, dentin, pulp, crown, gingiva and cementum.
	74. Given a body chart, identify by labeling the following parts of the digestive system: tongue pharynx — salivary glands stomach — esophagus cardiac sphinctor — pyloric sphinctor jujunum — duodenum ascending colon — ileum transverse colon — descending colon rectum — cecum anus — appendix gall bladder — liver sigmoid — pancreas
	75. On an unlabeled diagram of the digestive tract, indicate those places where chemical digestion of the following food groups takes place: starches, proteins and fats.
	76. Briefly define the term parastalsis.
	77. Briefly describe the digestive function of each of the following:

salivary gland — liver
pancreas — stomach
small intestine — large intestine
gall bladder — tongue

10. Excretory System
    a. Structure
    b. Function

78. In your own words, define bodily excretion.

79. Name four excretory organs and one product of each.

80. On a diagram of the urinary system, identify by labeling the following:
    renal pelvix — ureter
    medulla — capsule
    bladder — urethra

81. On a diagram of the nephron unit identify:
    afferent arteriole — efferent arteriole
    Bowman's capsule — glomerulus
    proximal tubule — loop of Henle
    distal tubule — collecting tubule

82. Describe briefly three functions of the kidney.

83. Describe the functions of the ureter, bladder and urethra.

84. Describe the characteristics of normal urine with regard to color, appearance and specific gravity.

11. Endocrine System
    a. Structure
    b. Function

85. Define the term endocrine, and explain how this system of glands differs from the exocrine glands.

86. On a diagram, name and locate seven endocrine glands.

87. Identify by name and state the function of one hormone produced by each of the following glands:
    pancreas — ovary
    testes — thyroid
    parathyroid — adrenal
    adrenal cortex — pituitary

12. Reproductive System
    a. Structure
    b. Function

88. Given a diagram of the male reproductive system, identify by labeling:
    testes — epididymis
    prostate — scrotum
    penis — vas deferens
    seminal vesicle — urethra
    urinary bladder — ejaculatory duct

89. Given a diagram of the female reproductive system and approximating structures, identify by labeling:
    ovary — uterus
    fallopian tubes — vagina
    cervix — urethra
    bladder — symphysis pubis
    vulva — urinary meatus
    anus

90. Name the primary functions of the ovaries, fallopian tubes, uterus, cervix and vagina.

91. Name the primary functions of the epididymis, seminal

Topical Outline	Measurable Objectives
	vesicles, testes, vas deferens, ejaculatory duct, prostate gland, urethra, penis, and scrotum.
	92. Trace the path of the sperm cell through the male reproductive system.
	93. Trace the path of the egg cell through the female reproductive system.
	94. Given a diagram, identify the approximate site where fertilization normally occurs.
	95. Describe the menstrual cycle as it applies to reproduction.
B. Introduction to Microorganisms	96. Define the term "microbiology".
1. Types of Microorganisms a. Bacteria b. Fungi c. Virus d. Other e. Pathogenic versus Non-Pathogenic	97. State whether the majority of microorganisms are beneficial or detrimental to man. 98. Define the terms pathogen and non-pathogen. 99. State two ways in which microorganisms perform functions beneficial to man. 100. In a short paragraph, summarize the development of the science of microbiology including important individuals and their contributions. 101. List five broad categories of microorganisms. 102. With prepared slides and a microscope or projector, identify the three basic types of bacteria. 103. Define and name two diseases caused by each of the following: bacteria, fungi, protozoa, viruses and rickettsiae. 104. Describe briefly the life requirements of bacteria.
2. Infection a. Sources 1. Food, Water and Air 2. Contact (Direct and Indirect) b. Susceptibility (Factors)	105. Define the term infection. 106. Describe the typical course of an infectious disease. 107. State how food, water and air can be sources of infection. 108. State the difference between infection by direct and indirect contact, and name five diseases transmitted by each. 109. Describe the role of five factors which affect one's susceptibility to disease.
3. Control of Microorganisms a. Asepsis 1. Definition a. Medical-Surgical b. Antisepsis c. Sepsis	110. Define the terms asepsis, sepsis and antisepsis. 111. Discuss asepsis, and state three situations where asepsis is especially important.

Topical Outline	Measurable Objectives
b. Isolation of Infection Sources 1. Patient 2. Visitors 3. Health Care Personnel	112. Describe four ways that disease is transmitted from one person to another. 113. List at least four ways for breaking the chain of infection at the portal of entrance. 114. List at least four ways for breaking the chain of infection at the portal of exit. 115. Briefly describe how the chain of infection is affected by normal body defenses and antibiotics.
c. Sterile Techniques 1. Avoiding Contamination 2. Disinfection 3. Sterile Field	116. Define the term sterile field, and identify common sources of contamination to it. 117. Contrast the difference between sterilization and disinfection. 118. In a simulated or actual clinical setting, practice the appropriate levels of aseptic technique appropriate to each given area.
4. Immunity a. Natural b. Acquired	119. Define the term immunity. 120. Discuss the following types of immunity: immunity at birth immunity acquired by exposure to disease immunity acquired by having had a disease immunity acquired by artificial means (immunization) 121. Differentiate between active and passive immunity. 122. Define antibodies, and state their functions.
C. Introduction to Interpersonal Relationships 1. Basic Social, Religious, Economic and Cultural Needs	123. List and discuss the basic needs of human beings.
2. Aspects of Personality a. Maturity	124. Discuss at least five characteristics of maturity.
b. Self-Awareness	125. Define the term stress.
c. Stress and Anxiety d. Mental Health	126. List three physiological causes of stress.
3. Interpersonal Interactions a. Relationship of Health Worker to Others 1. Patient 2. Family 3. Other Health Workers	127. List five emotional causes of stress. 128. List five emotional causes of stress in the hospitalized patient. (Some acceptable causes are: strange surroundings, lack of privacy, depersonalization, altered daily routine, isolation from family, fear of unknown, fear of disability, fear for job security, loss of income and medical expenses.) 129. Given a practical situation, recognize stress in self or others, and suggest means to relieve it. 130. Discuss the meaning of the terms normality, neurosis and psychosis.
b. Empathy and Sympathy	131. Discuss the defense of one's own rights with firmness, but without hostility.

Topical Outline	Measurable Objectives
	132. Differentiate between sympathy and empathy.
4. Communications a. Written b. Verbal c. Non-Verbal d. Observing, Reporting and Interviewing e. Medical Terminology and Abbreviations	133. Speak clearly in a well-modulated voice, to the instructor's (or examiner's) satisfaction. 134. Given a list of instructions, listen carefully and be able to repeat the essential content. 135. Shown a human interaction, record the behavior that communicates a non-verbal message, and interpret the non-verbal message. 136. Convey by tone of voice and facial expression an attitude of cordiality and interest, to the instructor's satisfaction. 137. In a job interview simulation, respond to questions easily, clearly and briefly while conveying essential information. 138. In a role playing situation, given a series of patient's comments and complaints, record the pertinent information he is attempting to communicate. 139. Define and spell correctly at least 85% of the Medical Terminology and Abbreviation List. (Prefixes, suffixes, and abbreviations commonly used in the health field, called the Medical Terminology and Abbreviation List, will be provided to the instructor.)
D. Preventive Aspects of Health Care 1. Psychological, Social and Spiritual	140. Briefly relate the importance of psychological, social, cultural and spiritual factors on the health of a person. 141. Using the following list, select at least one situation and show the interrelationship of the psychological, social, cultural and spiritual factors on the health of a person. parent child conflict job dissatisfaction marital discord religious conflict home environment financial difficulties self-image student pressures
2. Physical a. Personal Hygiene	142. In a brief paragraph or in a role playing situation, demonstrate to the instructor's satisfaction the importance of proper dental care, proper hair care, proper skin care and cleanliness of clothing to personal health, personal appearance and effect upon others. 143. List the five links of the tooth decay chain. 144. Define bacterial plaque. 145. Identify the least number of times per day it is necessary to disturb bacterial colonization to prevent tooth decay. 146. Identify two areas on the tooth where bacterial plaque most frequently accumulates. 147. Briefly describe the process of peridontal disease.

Topical Outline	Measurable Objectives
	148. Identify four criteria for a proper toothbrush according to ADA specifications.
	149. Given a disclosing tablet, toothbrush and dental floss, demonstrate the complete removal of plaque from teeth.
	150. Identify five snack foods that do not contain fermentable carbohydrates.
	151. Compare the relationship of exposure of fermentable carbohydrates and amount of carbohydrate to dental decay.
	152. Briefly explain the interrelationship of each of the following to dental health: regular dental exams frequency of plaque removal plaque removal by a) tooth brushing, b) flossing fluorides diet
b. Body Mechanics 1. Personal	153. Position your body in alignment and balance, and state the reason for the position of your feet, knees, buttocks, abdomen, thorax and head according to the standards of good posture.
	154. Demonstrate accurately the body movements of flexion, extension, hyperextension, adduction and abduction and describe the movements using terms given in class.
	155. Given an activity to perform at floor level (e.g. mopping up a spill or placing slippers on a patient's feet) the student will stoop keeping the body aligned and balanced using the large muscles of the thighs and buttocks for the activity.
	156. Given an object weighing ten to twenty pounds, demonstrate how to lift in such a manner as to minimize fatique and prevent straining.
	157. Given an object to push or pull (e.g. wheelchair, laundry cart or food cart) move the object by setting your muscles, using the leg muscles to supply most of the force needed, and using the body weight to assist in the movement.
	158. Given an activity that requires turning or pivoting (e.g. assisting a patient from bed to chair or turning from desk to filing cabinet) position the feet and body in such a manner that straining your back or trunk will be prevented.
2. Patient	159. Demonstrate how to properly position a patient in each of the following situations: eating in bed resting in bed sitting in a chair or wheelchair transferring from stretcher to bed transferring from bed to wheelchair assisting in walking assisting into automobile turning in bed

Topical Outline	Measurable Objectives
c. Handwashing	160. Demonstrate the correct technique for washing the hands as a means of maintaining standards of cleanliness that will minimize the risk of contracting or transmitting infections.
	161. Indicate the routes by which bacteria can be transmitted, state the conditions that are favorable and unfavorable to their growth, and suggest appropriate handwashing precautions against bacterial contamination.
	162. State at least five circumstances that necessitate washing the hands, as a result of direct or indirect contact with contaminated materials.
	163. Explain and demonstrate correct handwashing technique to others.
3. Proper Nutrition and Dietary Considerations	164. Define what is meant by proper nutrition.
	165. Identify four food groups, and state the recommended daily serving of each.
	166. Name five of the six types of nutrients, and briefly explain the function of each.
	167. List four causes of obesity.
	168. Briefly discuss some effects of obesity upon health or body systems functions.
	169. Identify two major health problems in the United States which are the result of improper nutrition.
4. Accident Prevention and Public Safety	170. Briefly describe the significance of the Occupational Safety and Health Act (OSHA) to institutional safety.
a. In the Home	171. Name five common types of accidents in the home, and describe the necessary precautions to prevent each.
	172. Name five types of accidents in health care facilities, and describe the necessary precautions to prevent each.
b. Institutional Safety 1. Radiation	173. List three sources of radiation danger in the hospital.
2. Handling and Storage of Chemicals and Drugs	174. Name three potentially hazardous chemicals, and discuss necessary precautions in handling and storage.
3. Gas Cylinders	175. Briefly describe the dangers associated with the handling and storage of oxygen and other pressurized gases.
4. Fire Extinguishers	176. Name the common types of fire extinguishers, and demonstrate their use.
5. Drugs, Use and Misuse	177. Write the five "rights" of drug administration.
	178. Explain why administration of drugs to patients must always be recorded.
	179. Write the dangers of self-medicating with a drug prescribed for another person.

Topical Outline	Measurable Objectives
6. Rehabilitation Concepts a. Social b. Physical c. Psychological	180. Given a list of conditions requiring rehabilitation, explain why it is necessary to consider the social, psychological, cultural and physical factors involved in rehabilitation. (list - coronary, stroke (cerebrovascular accident), alcoholism, blindness, impaired motion (arms, legs), mental illness, etc.)
7. Basic Health Care Tasks a. Measurements 1. Metric System 2. Temperature Scales 3. Measuring Devices	181. Given a list of measurements in the English system and with the aid of references, convert the following measurements to the metric system. lbs. to Kg. oz. to cc pts. to cc inches to cm.
	182. Name the measurement devices commonly employed in the health care industry, and state an advantage of each.
	183. Name the basic metric system units of length, mass and volume.
	184. Given the decimal equivalents of the metric prefixes kilo, milli, deci and micro.
b. Checking Patient I.D.	185. List at least five situations which require positive identification of the patient.
	186. State why the identification band is the safest method for positively identifying the patient in a hospital.
c. Vital Signs - Observations 1. Temperature	187. Given an oral thermometer, take and record body temperature with a precision of $\pm 0.1^{\circ}$F.
2. Pulse	188. Take and record a radial pulse with a precision of $\pm$ 4 beats.
3. Respiration	189. Take and record respiration rate.
4. Blood Pressure	190. Given a sphygmomanometer, determine another's blood pressure with a precision of $\pm$4mm of Hg.
d. Charting	191. Name two items of information that must appear on every page of a patient's chart.
	192. List at least five categories of information which are entered into the patient's chart.
	193. Discuss orally or in writing the confidentiality and the ethical considerations involving the patient's chart.
	194. Explain why certain health workers are not allowed to read the patient's chart.
e. Handling, Storage and Disposal of Chemicals, Specimens and Other Materials 1. Collecting Specimens 2. Aesthetics 3. Safety Considerations 4. Contamination, Decomposition, etc. of Materials 5. Disposal Procedures	195. Given a list of situations, list the precautions necessary in collecting and handling at least one of the following: urine specimen stool specimen sputum specimen bacterial culture
	196. Describe the procedures for decontamination of linens, instruments and dishes contaminated with infectious organisms.

Topical Outline	Measurable Objectives
	197. Describe the procedures for discarding of disposable items from hospitals and clinics.
	198. Discuss briefly the ecological consequences of disposal, e.g. dressings, plastics, syringes, glass, chemicals, etc.

III. Emergency Medical Care

A number of specific terms are associated with Section III.B. On the chance that a list of the applicable terms might be helpful, they are included below together with the Topical Outline section with which they are associated.

Topical Outline	Special Terms
B. Diagnostic Signs	
1. Pulse (Types, Ranges, Deviations)	pulse, carotid pulse, radial pulse, femoral pulse, carotid arteries, femoral arteries, radial arteries, pulse rate
2. Blood Pressure	blood pressure, systolic pressure, diastolic pressure, sphygmomanometer, stethoscope
3. Temperature	Fahrenheit, Celcius or centigrade, oral temperature, axiallary temperature, rectal temperature
4. Skin Appearance	subcutaneous blood vessels, skin pigment, cyanosis, jaundice, epidermis, dermis, oil gland, hair follicle, sweat gland, sensory nerves, subcutaneous fat tissue, muscle, nerves, sebum, sweat
5. Pupil Reaction	sclera, optic nerve, conjunctiva, iris, pupil, lens, cornea, eye lid, retina, lacrimal system, tear glands, tear ducts, prosthesis, dilation, constriction
6. Speech Deviation	
7. Motor Ability	paralysis, palsy, chorea, afferent, efferent, hemiplegic, quadriplegic, paraplegic
8. Bleeding	
a. Capillary	carotid artery, temporal artery, brachial artery, radial artery, femoral artery, facial artery, bleeding (hemorrhage), vein, capillary, blood clot, trauma, shock
b. Venous	
c. Arterial	
d. Signs of Internal Bleeding	
9. Conscious State	
10. Psychological State	
11. Respiration	respiratory rate, inspiration, expiration

Topical Outline	Measurable Objectives
III. Emergency Medical Care	
A. Definition and Discussion of Emergency	199. Define the term "emergency" in one sentence.
	200. From a list of symptoms and signs of emergency, indicate those that are life threatening and might require immediate care.

bleeding	breathing difficulties
unconsciousness	shock
pain	bruises
skinned knee	minor burn
contusion	choking
vomiting	diarrhea

Topical Outline	Measurable Objectives
1. Recognizing Personal Limitations	201. Answer each of the following questions: a. Who may legally initiate most emergency procedures? b. Who may decide that an emergency situation does not exist, and therefore dismiss the patient? c. Who should accept a patient's complaint at face value and care for the injury or illness? d. Who should assume that a highly emotional and demonstrative patient has a serious injury or illness? e. Who should assume that a stoic and undemonstrative patient does **not** have a serious injury or illness? f. When should attention to religious customs or needs be given? g. When may a conscious patient in an emergency situation be legally forced to receive medical treatment against his will?
B. Diagnostic Signs 1. Pulse (Types, Ranges, Deviations)	202. Define the term "pulse" in one sentence.
	203. List and locate on a body chart three places where the pulse can be most easily felt.
	204. State the range of pulse rate for the healthy adult and child.
	205. Describe the common causes of the following variations in pulse rate and volume: rapid, weak pulse rapid, pounding pulse absence of a pulse
	206. Explain why the carotid pulse is the most reliable one to check in emergency situations.
	207. Take the carotid pulse.
2. Blood Pressure	208. Define the term "blood pressure" in one sentence.
	209. Define the term "systolic pressure" in one sentence.
	210. Define the term "diastolic pressure" in one sentence.
	211. State the ranges of systolic pressure and diastolic pressure in healthy adults.
	212. State the significance of lowered blood pressure. (Insufficient pressure in the arterial system to pump blood to all the organs of the body.)
	213. State the common causes of lowered blood pressure.
3. Temperature	214. State the temperature for a healthy person in degrees Fahrenheit and degrees Celsius.
	215. Describe how the skin acts as a temperature regulator.
4. Skin Appearance	216. State what causes skin color.
	217. Describe the skin color of a healthy Caucasian, Black, Oriental and Indian.

Topical Outline	Measurable Objectives
	218. State alternate methods to determine pallor, cyanosis, erythemia and jaundice in Blacks, Caucasians, Orientals and Indians, and describe what each of the conditions means in terms of medical importance.
5. Pupil Reaction	219. Describe the appearance of the pupils of a healthy (uninjured) person.
	220. Describe the reaction of these same pupils to light. (Students should test reaction in class.)
	221. List common causes of the following changes or variations in one or both pupils: constricted pupil (ordinary light) dilated pupil (ordinary light) unequal pupil size failure of pupils to react to light
6. Speech Deviation	222. Describe changes in speech which might indicate that the patient is in need of emergency care.
7. Motor Ability	223. Define paralysis in one sentence.
	224. State the possible causes of impaired motion to the following body parts: one side of the body arms **and** legs legs, but **not** the arms any single extremity
8. Bleeding a. Capillary b. Venous c. Arterial d. Signs of Internal Bleeding	225. Define bleeding (hemorrhage) in one sentence.
	226. Define external bleeding in one sentence.
	227. Discuss types of bleeding, their signs and significance: capillaries veins artery
	228. List the three common methods to control external bleeding.
	229. Arrange the three methods of controlling bleeding in order of first, second and third choice, giving rationale for the selected arrangement.
	230. Using a universal dressing or gauze pad, demonstrate the technique of controlling external bleeding of the extremities.
	231. Describe how to apply a tourniquet emphasizing the following points: when to use a tourniquet dangers of indiscriminate use importance of using a wide tourniquet importance of marking patient

Topical Outline	Measurable Objectives
	232. Given a human subject or body chart, locate the following pressure points at the following arteries: carotid — femoral brachial — radial temporal — facial
9. Conscious State	233. Describe the conscious state of a healthy person in terms of alertness, orientation, and response to vocal or physical stimuli.
	234. As an example, compare and contrast changes in the state of consciousness between an intoxicated patient, a patient with a head injury, and a patient in a diabetic coma.
10. Psychological State	235. Given a list of conditions, underline those that may cause a patient to be emotionally disturbed or agitated.
	236. State the limited conditions under which a non-law enforcement officer may restrain or transport a patient against his will.
11. Respiration	237. Define respiration in one sentence.
	238. State the normal ranges of respiratory rate (breaths per minute) of the healthy adult and child.
	239. Recognize and list common causes of the following deviations from normal respiration: rapid, shallow respirations deep, gasping labored breathing little or no abdominal/chest movement little airflow at the mouth and nose frothy blood at the nose with coughing
C. Types of Injuries and Applied Emergency Care 1. Shock a. Types b. Symptoms c. Emergency Care	240. Define shock (state of collapse of the cardiovascular system).
	241. Given the list of common types of shock, give the signs and symptoms for each. hemorrhagic shock (blood loss) respiratory shock (unable to breathe sufficient amount of oxygen) psychogenic shock (temporary blood loss from brain) cardiogenic shock (inadequate heart function) septic shock (toxins from bacteria in the blood) anaphylactic shock (serious allergic reaction)
	242. List and describe at least eight symptoms (common indicators) of shock.
	243. Contrast anaphylactic shock symptoms with other types of shock.
	244. Rank the following techniques of treatment for shock in order, beginning with the most critical first: control bleeding splint fractures secure and maintain a clear airway keep patient warm record vital signs

Topical Outline	Measurable Objectives
	245. Outline the specific action for each type of shock (See No. 241 above).
	246. Assist in bringing patient (or simulated patient) out of shock by demonstrating the above principles. (See "Emergency Management of the Patient in Shock," by Robert M. Hardiaway, M.D., M.C., U.S.A., William Beaumont Army Medical Center, El Paso, Texas).
2. Airway Obstruction a. Symptoms b. Emergency Care*	247. List the important signs of adequate breathing. 248. List the important signs of impaired breathing. 249. Given a simulated situation restore adequate breathing by: positioning the head and jaw properly removing foreign material from nose and throat
3. Bleeding a. Methods of Control 1. Direct Pressure 2. Pressure Points 3. Tourniquets	(The methods of control of external bleeding were covered in Section III. B. 8., Measurable Objectives Nos.226-232, so only methods of control of internal bleeding will be covered here.) 250. Distinguish between the types of internal bleeding that can and the types that cannot be controlled. 251. Describe the general treatment for internal bleeding.
4. Soft Tissue Injuries a. Unexposed 1. Contusions (Brain, Trunk and Extremities) 2. Sprains 3. Strains b. Exposed 1. Abrasions 2. Lacerations 3. Incisions 4. Punctures 5. Burns 6. Contusions 7. Bites a. Venomous b. Non-Venomous	252. Distinguish between closed and open soft tissue wounds be defining each in one sentence and by giving examples of each. 253. Describe the proper order of treatment for managing open wounds (in general). 254. Describe the acceptable treatment for managing a venomous bite.
5. Cardio-Pulmonary Arrest a. Recognition of Arrest b. Types of Arrest (e.g. Electrical, Drowning, etc.) c. A, B, C's of Resuscitation d. Definitions of Clinical and Biological Death	255. Name the two signs of cardiopulmonary arrest (absence of breathing or absence of pulse and/or heart sounds). 256. List other signs that should alert one that cardiopulmonary arrest has occurred or is imminent (loss of consciousness, absence of blood pressure, dilated pupils, extreme pallor of skin, absence of bleeding from wounds). 257. Name the common causes of cardiopulmonary arrest. 258. Define clinical death. 259. Define biological death. 260. Discuss the significance of each type of death as it applies to treating a patient in cardiopulmonary arrest.

Topical Outline	Measurable Objectives
	261. Name the A, B, C's of resuscitation.
	262. Describe each step of the A, B, C's, including branch points (See page 9 "Life Support Decision Tree," **Standards for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiac Care (ECC)**, 1973, American Heart Association Publication).
	263. Using a model (e.g. Resusci-Anne), initiate CPR (See "Cardiopulmonary Resuscitation Manual for House Staff Physicians," The New Physician, March, 1966, Pages 36-50).
6. Poisoning	264. Define the term poison in one sentence.
	265. Give examples of the following types of poisons: surface poisons ingested poisons inhaled poisons injected poisons
7. Fractures a. Classes 1. Simple	266. Define the term fracture in one sentence.
2. Compound	267. Differentiate between the two types of fractures: (a) closed (simple); (b) open (compound) and explain why the latter is more dangerous.
b. Types 1. Spiral 2. Green-Stick 3. Comminuted 4. Depression 5. Longitudinal 6. Impacted 7. Oblique	268. Given sketches or pictures of each, identify each of the following classifications of fractures: green-stick — transverse oblique — spiral comminuted — impacted depressed
c. Emergency Care of Fractures 1. Communication with Patient 2. Observation 3. Handling - Immobilization, Transport 4. Asepsis	269. Define the term dislocation in a single sentence.
	270. Describe how each of the following signs or symptoms may indicate a fracture, dislocation or both: deformity tenderness and/or pain loss of movement or use grating (crepitus) swelling and discoloration (ecchymosis) exposed fragments
	271. Given a particular situation, place in chronological order the following steps in the discovery and emergency care for a suspected fracture or dislocation have patient attempt to move the extremity immobilize examine for hidden injuries ask the patient if there is pain observe for deformity carefully feel over each of the extremities (or spine) or press lightly
	272. State the principal objective of emergency splinting.
	273. Explain why fractures and dislocations should not be straightened (reduced) prior to splinting and the meaning of: "Splint where they lie."
8. Dislocations a. Symptoms b. Emergency Care	

Topical Outline	Measurable Objectives
	274. Given the necessary materials, perform the following on a simulated patient: treat and rigid splint an open fracture of the humerus or other bone.
	275. Demonstrate methods of lifting and transporting patients with fractures or dislocations.
9. Head Injuries a. Symptoms b. Emergency Care	276. List the signs of a skull fracture.
	277. List the signs and symptoms of brain damage.
	278. Describe emergency care for a skull fracture.
	279. Describe initial emergency care for patients with brain damage.
10. Spinal Injuries a. Symptoms b. Emergency Care	280. List the signs and symptoms of spinal injuries.
	281. Describe the splinting of an injured spine.
	282. Given a long backboard or special stretcher, lift and transport a simulated patient with a spinal injury (two students).
11. Convulsions	283. Define the term convulsion in one sentence.
	284. State the most important precaution to be taken to protect a patient in convulsion.
12. Chest and Abdominal Injuries a. Symptoms b. Emergency Care	285. Cite the important signs of chest injury.
	286. List the steps in the emergency care of a chest injury (critical ones first).
	287. State signs and symptoms of abdominal injuries.
	288. List the steps in the emergency care of an abdominal injury.
13. Burns a. Types b. Emergency Care	289. List the four major types of burns (according to cause).
	290. Name and describe the three degrees of burns.
	291. Match the appropriate emergency care items with each of the types of burns: heat burns, minor heat burns, moderate/severe chemical burns electrical burns immerse the burn in cold water flood burn with water cover burn with sterile dressing treat patient for shock, if necessary use cold, wet applications for pain relief cover with grease transport victim to an emergency facility
14. Drug Emergencies a. Reactions b. Overdose Emergencies	292. List the patient's physical and psychological reactions caused by stimulant drugs (uppers) and depressants (downers).
	293. State the principal emergency care procedure for a patient suffering from drug overdose.

Topical Outline	Measurable Objectives
A. Cell Structure	The student will be able to:
1. Nucleus 2. Membrane 3. Cytoplasm a. Organelles	1. Name and list a function for each of the following cellular organelles: mitochondria, endoplasmic reticulum, golgi bodies, ribosomes, lysosomes, nucleolus and nucleus.
B. Cell Function 1. Mitosis	2. Explain mitosis as a phenomenon of growth in somatic tissue by stating the chromosome number of resulting cells.
2. Meiosis	3. Explain meiosis as a process of sexual reproduction on germinal tissue by stating the chromosome number of the resulting cell type.
3. DNA and RNA Replication	4. Describe the locations of DNA and RNA in the cell.
4. Protein Synthesis	5. Briefly review the types of chemical bonds in the formation of proteins from amino acids.
5. Glycolysis	6. Relate the process of glycolysis from glucose breakdown to lactic and/or pyruvic acid.
6. Kreb's Cycle	7. Relate the Kreb's cycle from pyruvic acid breakdown to the production of energy, carbon dioxide and water.
7. Diffusion and Osmosis 8. Active Transport	8. Define the terms diffusion, osmosis and active transport, and give a specific example of each of these processes in cells of living organisms.
	9. Describe the effect of hypotonic and hypertonic solutions upon normal cells such as red blood corpuscles.
C. Levels of Organization 1. Types of Cells	10. Identify by sketching the following types of cells: a. three types of muscle cells b. bone cell c. cartilage cell d. neuron
2. Tissues a. Intercellular Material b. Types of Tissues	11. List two functions of each of the following four types of tissues: epithetial, connective, muscle and nervous.
3. Organs	12. Define an organ in one sentence, and list the tissues comprising one specific organ.
D. Systems 1. Integument a. Epidermis b. Dermis c. Glands	13. Identify by sketching a cross section of the integument, labeling the following diagnostic features: dermis, epidermis, hair follicle, sebaceous gland and sweat glands.
2. Skeletal a. Axial and Appendicular Names b. Diagnostic Features and Location	14. Given a human skeleton, point out and name three of the diagnostic features of each of the long bones of the appendicular skeleton.
	15. Describe the structure of long, short, irregular and flat bones with reference to compact bone, spongy bone and location of marrow.

Topical Outline	Measurable Objectives
	16. Given a human skeleton, list types of vertebra, listing the number and a characteristic of each type of vertebra.
	17. Given a human skeleton, list the bones of the pectoral and pelvic girdles.
	18. Given a human skeleton or a sketch, name and locate all of the major bones of the skull and face.
	19. Given a human skeleton or a sketch, locate and list two major diagnostic features of each of the bones of the skull and the sinus cavities.
c. Formation of Bone	20. Describe the formation of bone as it occurs in long and flat bones of the body in 50 words or less.
d. Growth of Bone	21. Describe the growth of a long bone as it occurs in the epiphyseal plate in 50 words or less.
e. Histological Structure and Function 1. Bone 2. Cartilage 3. Ligaments	22. Compare cartilage and bone by listing two features of each relative to structure, blood supply and growth.
f. Joints 1. Types 2. Movements	23. Given descriptive names of joints, give an example of each (ball and socket, hinge, etc.).
3. Muscular	
a. Histological Structure 1. Function	24. Name three major types of muscle tissue and state a function of each.
2. Physiology of Innervation and Contraction	25. Sketch a myoneural junction labeling a nerve ending, the source of the transmitter substance and effector cell membrane.
	26. Name two proteins found in myofibrils, and state the function of each.
b. Locations and Names of Major Muscles 1. Skeletal a. Origin b. Insertion c. Action 2. Smooth 3. Cardiac	27. Given the origin and insertions of five of the specific muscles in the list below, interpret and state the action involved with each. **or** Given the action of five of the specific muscles in the list below, give the point of origin and insertion for each. **List of Specific Muscles**: sternocleidomastoid, trapezius, latissimus dorsi, pectoralis major, serratus anterior, deltoid, biceps brachii, triceps brachii, brachialis, brachioradialis, gluteus maximus, gluteus minimus, gluteus medius, tensor fasciae latae, rectus femoris, vastus lateralis, vastus medialis, vastus intermedius, gracilis, adductor group, hamstrings, tibialis anterior, gastrocnemius, soleus, and levator ani.
4. Nervous a. Neuroglia and Neurons 1. Structure	28. Sketch a neuron and label the nucleus, dendrites, axons, cell body, myelin, neurolemma and nodes of Ranvier.
2. Transmission of Impulse	29. Briefly describe the all-or-none principle.

Topical Outline	Measurable Objectives
b. Central Nervous System	30. Explain a nerve impulse in terms of membrane permeability as affected by sodium ion and potassium ion concentration changes in 50 words or less.
	31. Sketch and label a lateral view of the brain in which the three main parts are located, and sketch and label the spinal cord noting the four main segment groups.
	32. State a major function for each of the three main parts of the brain using no more than one sentence for each.
	33. Name four lobes of the cerebrum, and state a function of each.
	34. Number and name the twelve cranial nerves, and state a function of each.
	35. Name three types of cerebral tracts, and state the function of each.
	36. Name the area of formation of cerebrospinal fluid.
	37. Describe the location and functions of cerebrospinal fluid in the central nervous system.
	38. Name the three meninges, and state the function of each.
	39. Briefly contrast the arrangement of gray and white matter in the brain and spinal cord, and state the significance of this.
	40. Briefly contrast the descending pyramidal and extrapyramidal tracts, and state a function of each.
	41. Briefly state the function of the ascending spinal tracts, and relate an example.
c. Peripheral 1. Reflex Arc 2. Synapse d. Autonomic	42. Sketch a cross section of spinal cord, and draw a simple reflex arc.
	43. Given a cross section drawing of the spinal cord, draw and label an autonomic reflex arc.
	44. Name the two divisions of the autonomic nervous system, and state some functions of each.
5. Sense Organs a. Eye	45. List the parts comprising the gross anatomy of the eye and accessory structures, and state a function of each part.
	46. Briefly describe the process by which light is converfed to electrical nerve impulses in the retina.
	47. Briefly describe eye movements and the extrinsic muscles involved.
b. Ear	48. List the three parts comprising the gross anatomy of the ear, the basic structures within each part, and state the function of each structure.

Topical Outline	Measurable Objectives
	49. Briefly describe how the Organ of Corti converts sound vibrations to nerve impulses.
c. Chemo-Mechano Receptors	50. Name and locate the receptors for the senses of smell, touch, pressure, pain, taste and equilibrium.
6. Circulatory a. Heart	51. Given a sketch of the heart, label the great vessels, chambers and valves, and indicate by the use of arrows the direction of blood flow from the vena cava to the aorta.
	52. Contrast the functions of the right and left sides of the heart, i.e. the volume pump versus the pressure pump.
	53. List and state the function of each of the three layers of the heart wall.
	54. List the four structures involved in the conduction of an impulse through the heart.
	55. Relate the cardiac cycle to the fluctuations on an EKG.
b. Vessels 1. Arteries 2. Veins 3. Capillaries 4. Lymphs, Ducts and Nodes	56. Differentiate among arteries, veins and capillaries by indicating the structure and stating the functions of each.
	57. Relate two ways that oxygen and three ways that carbon dioxide are carried in the blood stream.
	58. Locate the lymphatic system on a sketch of the human body, and state three of its functions.
c. Accessory Organs 1. Spleen 2. Thymus	59. Locate and state the major functions of the spleen and thymus.
d. Circulatory Systems 1. Pulmonary 2. Systemic 3. Portal	60. List the four main factors which would affect blood pressure systemically.
	61. Describe the portal system by routing the flow of a glucose molecule from the gastrointestinal tract through at least eight vessels until it reaches the biceps muscle of the right arm.
4. Fetal	62. Trace the fetal circulation by noting the four structures peculiar to the fetal circulatory system.
5. Coronary	63. Briefly explain how the heart is nourished by reviewing the circulatory route with special emphasis upon the coronary arteries.
6. Lymphatic	64. Describe the route of tissue fluid as it returns to the circulatory system.
e. Controls 1. Nervous	65. Briefly contrast the effect of sympathetic and parasympathetic nervous system on smooth muscle contraction.
2. Hormonal	66. Briefly describe the effect of epinephrine and acetylcholine upon cardiac muscle contraction.
f. Blood 1. Hemopoitic Tissue 2. Formed Elements 3. Plasma	67. Describe the blood as a tissue, listing all of the main types of cells, the structure where each is formed and state a function of each cell type.

Topical Outline	Measurable Objectives
4. Transport Functions	68. State three major functions of plasma.
5. Clotting Mechanism	69. Describe the mechanism of clotting by listing four steps and by citing three or four factors that artificially or normally inhibit or hasten the clotting process.
6. Blood Groups	70. Cite the four ABO blood types, and briefly describe the process for crossmatching blood.
	71. Briefly explain the relationship of erythroblastosis fetalis to the Rh factor.
7. Respiratory a. Structure 1. Airways	72. List five parts of the air conducting portion of the respiratory system, and identify one distinguishing feature of each part.
	73. State at least three functions which are common to all parts of the conducting portion of the respiratory system.
2. Lung Tissue	74. Identify the blood supply to the lung from the aorta.
	75. Name three parts of the respiratory portion of the lung, and state the functions of each part.
	76. Name the two layers of the pleura.
	77. Briefly distinguish between intrapleural and intrapulmonary pressures by noting the pressure changes with respiratory movements.
	78. Contrast inspiration and expiration as to the active process versus the passive process, and name two muscles involved when each one is active.
	79. Contrast upper and lower airways by listing two types of tissue composition changes for each airway.
	80. Briefly describe the function of surfactant with regard to respiratory distress syndrome.
b. Control of Respiration 1. Central Control	81. Name and locate three areas of central respiratory control.
2. Peripheral Control	82. Name two main types of peripheral respiratory controls, and relate two examples of each.
c. Mechanism of Breathing	83. Briefly describe the movement of the ribs and the diaphram in the process of breathing.
d. Gas Exchange 1. External Respiration 2. Internal Respiration	84. List four factors that affect the diffusion of oxygen and carbon dioxide at the alveoli.
	85. Describe the effects of carbon dioxide and body temperature upon oxygen uptake and release.
	86. Define anoxia, and relate two examples of it.
8. Gastrointestinal a. Digestive Organs and Secretions	87. Locate the extent of the pharynx and at least five major openings into this area.

Topical Outline	Measurable Objectives
	88. Name the coats of the intestinal wall, and cite at least two modifications found within the digestive tract.
	89. List in sequence from the mouth to the anus the seven major organs of the digestive tract citing at least one structural feature and one function of each organ.
b. Enzymes 1. Sources	90. Express the normal pH, to the nearest whole number, as found in the mouth, in the stomach and in the duodenum, and name the enzymes secreted in each area.
	91. Name three pancreatic enzymes, and identify the type of food which each of the three pancreatic enzymes will digest.
2. Functions	92. Demonstrate an understanding of the chemical phase of digestion by listing the end products of fat, carbohydrate and protein hydrolysis, and cite enzymes involved in the splitting of each of the three substances.
c. Accessory Organs 1. Liver and Gall Bladder	93. Given a torso diagram, sketch in the liver and the gall bladder, and two components of the common duct.
	94. Describe in one sentence the relationship of the liver to the gall bladder, and state four functions of the liver and two functions of the gall bladder.
2. Pancreas 3. Teeth and Tongue	95. Locate and describe the pancreas, citing two functions of this organ.
d. Absorption and Transport	96. List the organs of absorption, and state the type of material which is absorbed in each organ.
	97. Trace both routes of the absorption of food from the small intestine to the general circulatory system.
e. Excretion	98. List the end products of digestion which arrive in the colon for excretion, and cite the source of the fecal color.
9. Urinary a. Structure	99. Locate the kidney in the human body.
	100. Given a sketch of the longitudinal section of the kidney, identify and label at least five of the following: renal pelvis, calices, renal papillae, cortex, medulla, renal pyramids and renal columns.
	101. Sketch a nephron, labeling its five main parts and related vascular structures.
	102. Sketch and label the ureters, bladder and urethra, and state one function of each.
b. Function 1. Filtration	103. Relate three factors which would influence filtration at the glomerulus.
2. Secretion	104. Describe two functions of the tubules, and briefly explain the role of active transport in the tubule.
3. Controls	105. Name two hormonal controls on urine production, and identify the target tissue upon which each hormonal control acts.

Topical Outline	Measurable Objectives
c. End Products	106. Describe the five following characteristics of normal urine: color, pH, S.G., quantity and the major constituents.
10. Endocrine a. Structure and Location of Glands	107. Name and locate five endocrine glands.
	108. In two sentences differentiate between exocrine and endocrine glands, and describe the feedback mechanism.
b. Hormones 1. Types	109. Explain the function of the trophic hormones, and cite three examples of trophic hormones.
2. Functions and Interrelationships	110. List three hormones which affect the concentration of blood glucose, and name the endocrine gland which secretes each of the hormones.
	111. Write the name and a physiological effect of each major hormone secreted by the following endocrine glands: a. thyroid b. parathyroid c. pancreas d. anterior pituitary e. posterior pituitary f. adrenal cortex g. adrenal medulla h. testes i. intestinal mucosa (gastrin)
11. Reproductive a. Female Reproductive Organs 1. Structure 2. Function	112. List the glands, ducts and structures of the female reproductive system, and state a function of each major organ.
3. Hormones	113. Relate hormonal control to the typical ovarian cycle by sketching a graph of the cycle and indicating points of hormonal control upon the graph.
b. Male Reproductive Organs 1. Structure	114. List the glands, ducts and structures of the male reproductive system, and state a function of each major organ.
2. Function	115. List at least three accessory male reproductive glands, and cite the function and location of each.
	116. Identify the composition of the seminal fluid, trace the course of passage from the body and cite the conditions necessary for fertility.
3. Hormones	117. Name the hormone released by the testes, and describe their functions relative to the male sex characteristics.
c. Reproductive Mechanism 1. Gametogenesis	118. Name and describe at least four stages of oogenesis and spermatogenesis, contrasting the major differences between the two processes.
2. Fertilization	119. Locate the site at which fertilization usually occurs, and describe the process of fertilization.
3. Embryonic Development	120. Describe in one brief paragraph the exchange of nutrients and wastes as carried out by the placenta.
d. Birth Control	121. Explain how birth control drugs alter the normal pattern of hormonal control and causes other effects in the body.

Topical Outline	Measurable Objectives
	and list other methods of birth control together with the advantages and disadvantages of each.
F. Homeodynamics: Examples of System Integration 1. Regulatory Mechanisms a. Electrolyte Balance	122. Define electrolyte balance.
	123. Relate three effects of electrolyte unbalance.
b. Acid/Base Balance	124. Describe metabolic and respiratory acidosis and alkalosis.
	125. Name the three buffer systems in the body.
	126. State three factors which could alter acid/base balance.
	127. In comparison with normal values, contrast the values of pH, pCO_2 and HCO_3- concentration in blood plasma during conditions of acidosis and of alkalosis.
c. Body Temperature	128. State five factors which will cause an increase in body temperature.
2. Adaptation of Stress	129. List three physiological responses of the body in meeting stress.
	130. List three pathological conditions which are due to stress.
G. Metabolism	131. Define the term metabolism, and differentiate between anabolism and catabolism.
	132. Define basal metabolic rate.
	133. List five factors that would influence normal basal metabolic rate.
	134. Name the three main food sources of energy, and indicate which one is the best source of energy.
	135. List five water-soluble and four fat-soluble vitamins.

Training/Education Area: Chemistry

Topical Outline	Measurable Objectives
	The student will be able to:
A. Measurements 1. Metric System 2. Temperature Scales 3. Volumetric 4. Gravimetric 5. Significant Figures	1. List the metric units and their abbreviations that are commonly used in measurements of mass, volume and length. 2. Given the prefixes of micro-, milli-, centi-, deci- and kilo-, write the values of the prefixes as fractions or decimals. 3. Make conversions between metric units of length. 4. Make conversions between metric units of mass. 5. Make conversions between metric units of volume. 6. Make the following conversions: pounds to kilograms and vice versa ounces to grams and vice versa inches to centimeters and vice versa fluid ounces to milliliters or cubic centimeters and vice versa degrees Fahrenheit to degrees Celsius (Centigrade) and vice versa 7. Given the mass and volume of a substance, calculate the density (or specific gravity) of the substance. 8. Define the following terms: temperature, potential energy, kinetic energy, calorie and large calorie. 9. Demonstrate the ability to make volume measurements with the graduated cylinder, pipet and buret, to the stated precision of the apparatus. 10. Demonstrate the ability to use a chemical laboratory balance and a single-pan analytical balance to determine the weight of an object to the nearest 0.01 g and 0.001 g, respectively.
B. Atoms 1. Structure 2. Symbols 3. Electronic Configuration	11. Define the following terms: atom, nucleus, orbital, proton, neutron, electron, isotope, atomic number and atomic mass. 12. Given the number of electrons, protons and neutrons for an atom, draw a simple diagram showing the relative positions of these particles within the atom. 13. Given the name of an element in the list of elements below, write the symbol of that element, and vice versa. List of elements: hydrogen, helium, lithium, beryllium, boron, carbon, nitrogen, oxygen, fluorine, neon, sodium, magnesium, aluminum, phosphorus, sulfur, chlorine, argon, potassium, calcium, strontium, zinc, cobalt, arsenic, bromine, iodine, mercury, lead, silver, gold, tin, radium, uranium, manganese and copper. 14. Write the electronic configuration ($1s^2$, $2s^2$, $2p^6$, etc. . .,) for the first twenty elements.

Topical Outline	Measurable Objectives
	15. Write Lewis symbols for the representative elements.
	16. Sketch the orbital shapes of the s and p orbitals.
	17. Given a list of electrons or protons and neutrons present in a variety of unidentified atoms, group together those atoms which are isotopes of the same element.
	18. Given the atomic number and atomic mass of an isotope, calculate the number of protons or electrons, and neutrons.
	19. Given the number of neutrons and the number of protons or electrons of an isotope, calculate the atomic number and the atomic mass.
C. Periodicity 1. Chemical Families 2. Properties of Elements 3. Valences	20. Define the following terms: period, group, family, row, representative elements, transition elements, metal, nonmetal, metalloid, ion, ionization energy, atomic radius, ionic radius, ionic charge, oxidation state, rare gas and rare gas configuration.
	21. Given a periodic chart, predict and explain group and period trends in electronegativity, atomic radius, ionic radius, valence and ionization energy.
	22. Given the group number of a representative element, state the group name and the ionic charge or oxidation number obtained by the gain or loss of electrons necessary to attain the electronic configuration of the nearest rare gas.
	23. List the common oxidation states (suggested ones are in parenthesis) for the following elements whose oxidation states are not readily determinable from the group number: iron (2+, 3+), cobalt (2+, 3+), nickel (2+), copper (1+, 2+), silver (1+), tin (2+, 4+), mercury (1+, 2+) and lead (2+, 4+).
D. Compounds 1. Formulas 2. Naming of Compounds	24. Write the formulas and names of binary compounds formed from the elements listed in measurable objective No. 13.
	25. List the names, formulas and ionic charges of the following complex ions: nitrate, nitrite, sulfate, sulfite, carbonate, bicarbonate, phosphate, monohydrogen phosphate, dihydrogen phosphate, perchlorate, chlorate, chlorite, hypochlorite, chromate, dichromate, permanganate, acetate, hydroxide, cyanide and ammonium.
	26. Given an anion and a cation, by name or by symbol or formula, derived from the list of elements or the list of complex ions in measurable objectives No. 13 and No. 25, respectively, write the formula and name of the compound which would be formed by a combination of the two ions.
	27. Given the names of two elements and a periodic chart, predict whether a covalent or ionic bond will form between the elements.
E. Stoichiometry 1. Atomic Weights	28. Distinguish among atomic number, mass number and atomic weight.

Topical Outline	Measurable Objectives
2. Molecular Weights 3. Mole Concept	29. Define the following terms: mole, molecular weight, gram-molecular weight, and Avogadro's number.
	30. Given a molecular formula, calculate the molecular weight to the nearest 0.1 amu. (A periodic chart or table of atomic weights may be used).
	31. Given the number of atoms or molecules of a substance, determine the number of gram-molecular weights (moles) of the substance.
	32. Given the weight of a substance and its formula, calculate the number of moles.
	33. Given the number of moles of a substance and its formula, calculate the weight of the substance.
F. Molecular Structure and Bonding 1. Electrovalent 2. Covalent 3. Metallic 4. Molecular Orbitals	34. Define and differentiate among the following types of bonding forces: ionic, covalent, coordinate-covalent, hydrogen, Van der Waals forces, metallic, sigma and pi.
	35. Given an atom of each of two representative elements, predict whether an ionic or covalent bond will form (use of periodic chart is allowed).
	36. Given the formula of a compound or complex ion, determine the oxidation number of each element present.
	37. Draw the Lewis structures for such binary, covalent compounds as water, ammonia, methane, carbon tetrachloride, hydrogen chloride and carbon dioxide.
	38. Given the structure of a covalent compound, indicate those bonds which are polar.
	39. Draw the Lewis structures and molecular orbital descriptions for ethane and ethene (ethylene).
	40. From the following compounds select all pairs which will form hydrogen bonds with one another: water, methane, hydrogen fluoride, carbon tetrachloride, ammonia and carbon dioxide.
G. Chemical Equations 1. Balancing 2. Stoichiometric Calculations	41. Given the formula of a compound, calculate the percentage by weight of each element present.
	42. Given the percentage by weight of each element present in a compound, calculate the empirical formula.
	43. Given the empirical formula and the molecular weight, calculate the molecular formula.
	44. Given an unbalanced equation, balance the equation. (The chemical equations will be those which can be balanced by inspection only).
	45. Given the number of moles of a reactant or product in a balanced chemical equation, calculate the number of moles of any other reactant or product.
	46. Given the number of moles or weight of one reactant or product in a balanced chemical equation, calculate the

Topical Outline	Measurable Objectives
	number of moles or weight of any other reactant or product present in the equation.
	47. Given the weight of each reactant and product in a given balanced, chemical reaction, determine the limiting reagents and the amounts of other reagents in excess, if any.
H. Chemical Reactions 1. Types of Chemical Reactions	48. Given examples of chemical reactions, classify them as one of the following types of reactions: synthesis, replacement, decomposition and redox.
I. Acids, Bases and Salts 1. Structure 2. Properties 3. Reactions 4. pH and Buffers	49. Given the name or formula of an acid or base from the list below, give the formula or name, respectively. Acids: HCl, $HClO$, $HClO_2$, $HClO_3$, $HClO_4$, H_2S, H_2SO_3, H_2SO_4, HNO_2, HNO_3, H_3PO_4, CH_3COOH, H_2CO_3, H_3BO_4 Bases: NaOH, KOH, $Ca(OH)_2$, $Mg(OH)_2$, NH_3, NH_4OH, $Al(OH)_3$
	50. Define the following terms: neutral, neutralization, pH, acidic, basic, strong acid, weak acid, strong base, weak base, buffer, dilute and concentrated.
	51. Identify each of the acids and bases listed in measurable objective No.49 as being weak or strong with an accuracy of 80%.
	52. Write a balanced reaction in which the reactants are one acid and one base taken from the list of acids and bases given in measurable objective No.49.
	53. Given an acid or base from the list in measurable objective No.49, write the equation for its ionization or dissociation in water.
	54. Define acids and bases in terms of the Arrhenius Theory and in terms of the Brønsted Theory.
	55. Given a balanced equation representing the reaction of a substance with water, identify the substance as an Arrhenius acid or base.
	56. Given a balanced equation representing an acid-base reaction, correctly identify each of the reactants as a Brønsted acid or a Brønsted base.
J. States of Matter 1. Gases 2. Liquids 3. Solids 4. Applications to Health Science	57. State the basic concepts of the Kinetic Molecular Theory and, on the basis of this theory contrast the physical properties of gases, liquids and solids.
	58. State and explain in terms of the Kinetic Molecular Theory, each of the following: Boyle's Law, Charles' Law and Dalton's Law of Partial Pressures.
	59. Given the percentage molar composition of the atmosphere or any mixture of gases at a stated pressure and percentage molar composition, calculate the partial pressure of each component.
	60. Given a temperature in degrees Celsius (centigrade), calculate the temperature in degrees Kelvin (absolute).

Topical Outline	Measurable Objectives
	61. Using Charles' Law or Boyle's Law and given values for three of the four variables, calculate the value of the remaining variable.
	62. Using the ideal gas law (PV=nRT), and given values of three of the four variables, calculate the value of the remaining variable.
	63. Given the partial pressures of carbon dioxide or oxygen in the atmosphere and in the blood, describe the exchange of gases between the atmosphere and blood in terms of partial pressure differences.
	64. Briefly discuss the application of gas laws to an Intermittent Positive Pressure Breathing Apparatus (IPPB).
K. Solutions 1. Concentration Units 2. Electrolytic and Non-Electrolytic Solutions 3. Effects of Solution Concentration upon Cells 4. Osmosis 5. Dialysis	65. Define the following terms: solvent, solution, solubility, electrolyte, non-electrolyte, strong electrolyte, weak electrolyte, concentrated, dilute, saturated, unsaturated, supersaturated, percent by weight, percent by volume, weight/volume percent (mg%, g%), molarity (M), normality (N), ppm, osmosis, diffusion, dialysis, osmotic pressure, osmotic concentration, physiological concentration (isotonic, hypotonic, hypertonic) and colloidal dispersion.
	66. Describe the effects of temperature, pressure, surface area, nature of solvent and nature of solute on the solubility of a given substance.
	67. Define the terms strong electrolyte, weak electrolyte and non-electrolyte, and give one example of each.
	68. Discuss the effect of solubility upon conductivity.
	69. Given the name and/or formula of a compound, the concentration and the volume desired, calculate the weight of solute needed and describe the procedure used to prepare the solution.
	70. Given the concentration of two solutions separated by an osmotic membrane, determine which solution has the greater osmotic pressure and the direction of osmosis.
	71. Given the osmotic concentration of a solution, predict whether cells will undergo hemolysis or crenation when placed in the solution.
	72. Discuss the phenomena of dialysis as applied to hemodialysis units.
L. Chemical Kinetics (Non-Mathematical) 1. Factors Affecting Rates	73. Define the term chemical kinetics.
	74. Explain the effects of the following changes on the rate of a chemical reaction: concentration, temperature, pressure, particle size, nature of the reactants (ionic vs. covalent), and the presence or absence of a catalyst.
M. Chemical Equilibrium (Non-Mathematical) 1. State of Equilibrium	75. Define the following terms: dynamic equilibrium, chemical equilibrium (molecular and ionic), Le Chatelier Principle, pH, buffer solution and hydrolysis.

Topical Outline	Measurable Objectives
2. Factors Affecting Equilibrium 3. Acid/Base Equilibria	76. Given a balanced chemical equation including the enthalpy (heat) value, determine the effects of the following on the equilibrium of the reaction represented by the equation: change of concentration of one of the components, a change in temperature, a change of pressure and the addition of a catalyst. 77. Write the balanced equation representing the ionization (autoprotolysis) of water. 78. Write the balanced equations for the ionization of common weak acids, weak bases and electrolytes. 79. Given the value of K_W for water (1×10^{-14}), and the hydrogen ion concentration in a solution, calculate the hydroxide ion concentration. 80. Given the value of K_W for water and the hydroxide ion concentration in a solution, calculate the hydrogen ion concentration. 81. Given the hydrogen ion concentration in a solution, calculate the pH of the solution. 82. Given the pH of a solution, calculate the hydrogen ion concentration in that solution. 83. Given the hydroxide ion concentration of a solution, calculate the pH of that solution. 84. Given the pH of a solution, calculate the hydroxide ion concentration in that solution. 85. Given a pH value, state whether the solution is acidic, basic or neutral. 86. Given a list of pH values, arrange them in order from the most acidic to the most basic. 87. State the effect of adding the salt of a weak acid to a solution of that acid or of adding the salt of a weak base to a solution of that base in terms of the Le Chatelier Principle. 88. Write the Henderson-Hasselbalch equation for a buffer system. 89. Given the pK_a value of a buffer system and the concentrations of the buffer components, calculate the pH of the solution. 90. Given the carbonate/bicarbonate system of the blood, show by means of chemical equations how the system operates to maintain control of the hydrogen ion concentration, the hydroxide ion concentration and the pH of the blood. 91. Given the name or formula of a common salt, and predict whether it will be acidic, basic or neutral in water solution. 92. Define alkalosis and acidosis in terms of the pH of the blood, specifically in reference to the normal pH range.

Topical Outline	Measurable Objectives
N. Nuclear Chemistry 1. Radioisotopes 2. Applications to Nuclear Medicine 3. Applications to Radiation Therapy	93. Define the following terms: radioactivity, radioisotope, alpha particle, beta particle, gamma ray and half-life. 94. Given a nuclear reaction with one atomic symbol or particle missing, supply the missing item. 95. Given the mass of a radioisotope and the half-life, calculate the quantity of the isotope remaining after 1, 2, 3, and 4 half-lives. 96. Discuss applications of radioisotopes to diagnostic medicine. 97. Discuss applications of radioisotopes to radiation therapy. 98. Discuss the health hazards of radiation.
O. Carbon Chemistry 1. Nomenclature and Structures of the Functional Groups	99. Given the name, draw the structural formulas; or given the structural formulas, give the names of the first ten members of the straight chain alkane series. 100. Given a structural formula for any alkane not exceeding ten carbons, give the IUPAC name. 101. Given the structural formula for any alkene not exceeding ten carbons, give the IUPAC name. 102. Draw the structural features of the following organic functional groups: primary alcohol, secondary alcohol, tertiary alcohol, phenol, primary amine, secondary amine, tertiary amine, thioalcohol (mercaptan), ether, thioether, disulfide, alkyl ammonium salts, aldehyde, ketone, hemiacetal, hemiketal, acetal, ketal, carboxylic acid, carboxylate salt, ester, primary amide, secondary amide and tertiary amide. 103. Given the name of any functional group listed in the above measurable objective, give the formula; or given the formula, give the name. 104. Given a structural formula containing up to ten carbon atoms and one or more of the functional groups listed below, name the compound using the IUPAC convention. Functional groups: alcohol, mercaptan, ether, aldehyde, ketone, carboxylic acid, ester, amine and amide. 105. Given a structural formula of an acid or aldehyde containing from one to five carbon atoms, provide the common name of the compound, i.e. formic acid, acetic acid, ... valeric acid and formaldehyde, acetaldehyde, ... valeraldehyde. 106. Given the IUPAC name of a compound as described in the above measurable objective, write the structural formula. 107. Contrast the bonding in ethane, ethylene and acetylene using molecular orbital descriptions. 108. Given the structural formulas, give the names; or given

Topical Outline	Measurable Objectives
	the name, give the structural formula of the following representative aromatics: benzene, toluene and naphthalene.
	109. Given the structural formula, give the name; or given the name, give the structural formula for the following representative hetrocyclic nitrogen compounds: pyridine, purine, pyrinidine, furan and pyran.
	110. Define the following terms: geometrical isomerism and optical isomerism, and give two examples of each.
2. Physical Properties 3. Simple Reactions a. alcohols and mercaptans b. ethers c. aldehydes and ketones d. carboxylic acids and esters e. amines and amides	111. Contrast the chemical reactivity of ethane and ethene (ethylene).
	112. Given the reactants (either by name or by structure), write the structure of the organic product(s) and name the functional groups produced in the following types of reactions: hydrogenation of a double bond or triple bond hydration of a double bond dehydration of an alcohol (inter- or intramolecularly) oxidation of primary alcohol oxidation of secondary alcohol oxidation of mercaptans reaction of alcohols with inorganic acids (esterification) reduction of disulfides reduction of aldehydes reduction of ketones oxidation of aldehydes reaction of aldehydes with alcohols reaction of ketones with alcohols reaction of hemiacetals with alcohols reaction of hemiketals with alcohols reduction of carboxylic acids hydrolysis of acetals hydrolysis of ketals reaction of carboxylic acids with alcohols reaction of carboxylic acids with amines hydrolysis of esters hydrolysis of amides saponification of esters reaction of amines with mineral acids reaction of carboxylic acids with bases
4. Applications to Health Science P. Biochemical Compounds 1. Carbohydrates	113. Define the following terms: carbohydrate monosaccharide, disaccharide, trisaccharide, oligosaccharide, polysaccharide, aldose, ketose, triose, tetrose, pentose, hexose, heptose, hemiacetal, kemiketal, acetal and ketal.
	114. Explain the significance of the "D" in the names of the common sugars.
	115. Draw the Fisher open-chain projection structures of D-ribose, 2-deoxy-D-ribose, D-glucose, D-fructose and D-galactose.
	116. Draw the Haworth structures illustrating the difference between alpha and beta forms of D-glucose and of D-galactose.
	117. Explain the difference between a reducing and a non-reducing sugar.

Topical Outline	Measurable Objectives
	118. Define the classes of compounds known as glycosides, and the types of bonding known as a glycoside bond.
	119. Draw structures to illustrate the differences among alpha-1,4; beta-1,4; alpha-1,6 glycoside bonds.
	120. List the hydrolysis products of maltose, isomaltose, lactose, sucrose, cellobiose, cellulose, starch, amylose, dextrin, omylopeetin and glycogen. (Note: Isomaltose is important in the chemistry of dental plaque.)
	121. Compare the structures and origins of the polysaccharides: starch, cellulose, glycogen, dextran and levan. (Dextran and levan are also important in the chemistry of dental plaque.)
2. Lipids	122. Define the following terms: fatty acid, simple lipid, simple ester, glyceryl ester, phosphate ester, fat and oil.
	123. List the common classes of lipids, and give one source and one physiological function for each class.
	124. Draw structures of representative mono-, di- and triglyceride.
	125. Given a glyceride (mono-, di-, or tri), write the products of an acid or enzymatic hydrolysis.
	126. Given a glyceride (mono-, di-, or tri-), write the products of complete hydrolysis by sodium hydroxide (saponification).
	127. Explain the difference between each of the following pairs: saturated and unsaturated fat saponifiable and non-saponifiable lipid triglyceride and phospholipid
	128. Compare, using appropriate illustrations, the structures of soaps and detergents, and explain how they act as emulsifying agents.
3. Amino Acids and Proteins	129. Define the following terms: α-amino acids, peptide (amide) bond, dipeptide, polypeptide, simple protein, conjugated protein, isoelectric pH, basic amino acid and acidic amino acid.
	130. Define the term **essential amino acid**, and describe the basic physiological difference between the essential and non-essential amino acids.
	131. Draw the structures of an amino acid and a dipeptide in the classical and the zwitterionic forms.
	132. Given an amino acid and its isoelectric pH, discuss the effect of changing the pH of the medium on the structure of the amino acid.
	133. Describe the bonding and intra-molecular forces responsible for: the primary structure of proteins the secondary and tertiary structures of proteins

Topical Outline	Measurable Objectives
	134. Describe the process of protein denaturation, reversibly and irreversibly, in terms of changes in the primary, secondary and tertiary structures.
	135. Prepare a block diagram of the nitrogen cycle in nature.
	136. List four classifications of conjugated proteins, and give one example of the physiological importance of each.
4. Nucleic Acids	137. Distinguish among nucleic acids, nucleotides and nucleosides.
	138. List the products formed upon complete hydrolysis of RNA and of DNA.
	139. Explain what is meant by and the significance of base pairing, double helix and genetic code.
	140. Outline the major steps or sequence of events in protein biosynthesis, indicating the roles of DNA and ribosomal RNA, messenger RNA and transfer RNA.
Q. Enzymes and Regulators	141. Define and/or distinguish among these terms: enzyme, apoenzyme, holoenzyme, coenzyme, metal ion activator, vitamin, provitamin, hormone, prostaglandin, proenzyme, zymogen and substrate.
1. General Characteristics 2. Specificity	142. Explain what is meant by the "Lock and Key" theory of enzyme action.
3. Kinetics and Mechanisms	143. Describe the effects of temperature, pH, substrate concentration and enzyme concentration upon the kinetics of enzyme catalysis.
	144. Explain the difference between reversible and non-reversible inhibition.
a. Enzyme Catalysis b. Enzyme Inhibition	145. Given the Lock and Key theory, explain what is meant by: active site, binding site, catalytic site, group specificity, absolute specificity and inhibition.
4. Vitamins, Hormones, Prostaglandins and Co-Factors	146. Explain and give examples of how an enzyme assay may be used as a "chemical biopsy" for diagnosis of state of health.
	147. Compare the Lock and Key theory to the mechanism of antigen-antibody reactions. (NOTE: Objectives No.148-No.163 could also be taught in a nutrition course.)
	148. Contrast the physiological functions of vitamins, hormones and prostaglandins.
5. Pathological Indicators (LDH, SGOT, DGPT)	
R. Chemistry of Digestion 1. Enzymes	149. Describe the process of salivary digestion including the functions of mucin, salivary amylase, bicarbonate acid, phosphate io and bacteria of the mouth.
	150. Describe the process of gastric digestion.

Topical Outline	Measurable Objectives
	151. Describe the process of intestinal digestion including the functions of bile, intestinal fluid and pancreatic fluid.
2. Absorption	152. Describe the process of absorption of the end products of protein, carbohydrate and lipid digestion, indicating the form in which each is absorbed.
S. Metabolism	
1. Bioenergetics	153. By means of a block diagram, describe how energy released by metabolism (catabolism) of carbohydrates and lipids is stored in ATP, and how it is released to drive energy requiring reactions (endothermic reactions).
	154. Define the following terms: metabolism, anabolism and catabolism.
2. Carbohydrates	155. Define and distinguish among the terms: gluconeogenesis, glycogenesis and glycogenolysis.
	156. By means of a block diagram, show the interrelationships between glycolysis, the citric acid cycle, the respiratory chain, the Cori cycle and the hexose monophosphate shunt.
	157. Define each of the following terms: hypoglycemia, hyperglycemia, renal threshold, hypoinsulinism and diabetes mellitus.
	158. Describe and compare the role of insulin, glucogen and epinephrine in the chemical maintenance of proper blood glucose level.
3. Lipids	159. Define the terms lipogenesis and lipogenolysis.
	160. By means of a diagram, show the major steps in the metabolic interconversion of fatty acids and acetyl coenzyme A.
	161. Define and give one example for each of the following: ketosis, ketonuria and lactic acid acidosis.
4. Proteins	162. Define the following terms: nitrogen cycle, nitrogen balances and ornithine cycle.
	163. Define and give examples of oxidative deamination and transamination.
	164. By means of diagrams, show the interrelations of carbohydrate, lipid and protein metabolism, indicating the importance of acetal coenzyme A.
5. Hormonal Control	
T. Body Fluids	
1. Chemical Composition of Blood	165. List the major chemical constituents of human blood.
2. Urine	
a. Normal Composition	166. List the major chemical constituents of normal urine.
b. Pathological Constituents	167. List the major pathological constituents of urine.
c. Diuresis	168. Describe the physical processes taking place in diuresis.
d. Urine Analysis	169. List and describe the common tests used to determine the presence or absence of the common pathological constituents of urine.
3. Other Fluids	
4. Fluid Balance	170. By means of diagrams and appropriate chemical equa-

Topical Outline	Measurable Objectives
a. Metabolic b. Solution Therapy c. Effect of Respiratory Rate d. Gas Exchange e. Hypovalemic Shock	tions, illustrate gas exchange (O_2 and CO_2) at the lung interface and the tissue interface. 171. State the pH range for normal blood, and describe the buffer systems that help to maintain this level. 172. Describe the process of exchange of water and solute in tissues including use of the terms osmotic pressure, blood pressure and solute concentration. 173. Distinguish between the following pairs of conditions: respiratory and metabolic alkalosis; respiratory and metabolic acidosis. Give an example of body chemistries (for example, hyperventilation) which are responsible for each of these conditions. 174. Describe the integrated or coordinated fluid-electrolyte balance mechanisms of the human body.

Training/Education Area: Interpersonal Relationships

Topical Outline	Measurable Objectives
(See the notes on the last page of this secondary core curriculum area prior to evaluating and/or commenting on the measurable objectives.)	The student will be able to:
A. Stages of Growth and Development	1. Identify the stage of growth and development of an individual when given basic information about the individual's typical behavior.
B. Mental Health and Basic Needs 1. Mental Health Continuum (Homeodynamics) a. Adaptive Mechanisms	2. Using a diagram, describe the mental health continuum (homeodynamics). 3. Given a situation of an individual in everyday life, describe adaptive mechanisms which the individual exhibits.
	4. Define a crisis, and will be able to give two examples each of life crises and maturational crises.
	5. Given a situation of an individual in crisis, describe the behavior of the individual that is indicative of an adaptive mechanism. (Behavior indicating examples: anxiety, depression, regression, dependence and self-absorption.)
b. Stages of Grief	6. Given a case situation, identify the stages of grief that a person or family is experiencing as defined by Dr. Elisabeth Kuebler-Ross in "Death and Dying".
	7. Begin to recognize his own concept of death by describing it in 200 words or less or by drawing an illustration.
2. Basic Needs	8. Given a description of an individual's behavior, or while interacting with an individual, identify the individual's basic needs which have priority at the time.
C. Self-Awareness (Understanding Self) 1. Self-Concept	9. Become aware of himself/herself as a person with varying physical, psychological, social, spiritual and developmental needs, and identify in writing what needs he/she had in a given situation and how these needs were or were not met. (Some examples of needs are comfort, acceptance and self-esteem.)
	10. In a given situation or interaction, identify his/her own feelings by recording them in a verbatim process recording. (An example of such a situation or interaction is given below.) Setting: Lounge of Senior Citizen Center

Resident Says	Student Says	Feelings and Reactions of Student and Inferred Feelings of Resident
	"It seems to be pretty busy around here today."	I was really nervous as to how to start the conversation.
"Yes, this center is a great place. It gives me somewhere to be needed."		Mr. really took off.
	"Needed?"	Reflective technique.

Topical Outline	Measurable Objectives
2. Values and Prejudices	11. Recognize his/her own values and prejudices and how they may interfere with their professional responsibilities, and will maintain a therapeutic environment to the instructor's satisfaction.
3. Strengths and Limitations	12. Develop an awareness of his/her strengths and limitations by evaluating self and by peer and instructor evaluations of clinical interactions.
D. Uniqueness of the Individual Person 1. Individual as a Patient	13. In a given situation, recognize the patient as a unique individual with varying reactions and responses to stress, and record the individual's particular behavior.
a. Physical, Psychological, Spiritual, Cultural, Developmental and Social Needs	14. Recognize physical, psychological, spiritual, cultural, developmental and social needs of an individual, and describe one need in each area for a particular individual.
b. Patient's Apprehensions and Anxieties	15. In a clinical setting, recognize an individual's apprehensions and anxieties, and communicate with the patient using techniques that allow the patient to express these feelings.
c. Patients' Bill of Rights	16. Identify four of the items on the patient's bill of rights.
d. Patients' Right of Privacy	17. Respect the individual's right to privacy, and always provide privacy for the individual and his family.
e. Patients' Right to Confidentiality	18. Respect the need for confidentiality, and will provide confidentiality for patients and their families by treating all information received as privileged communication outside the classroom and professional setting.
2. Individual as a Family Unit and Community Member a. Apprehensions of Family Members	19. In an actual or simulated clinical setting, recognize the relatives' apprehensions and concerns for the patient, and will communicate with the relatives using techniques that allow them to express these feelings.
b. Family Values and Prejudices	20. Recognize the individual as a member of a family unit with its own values, prejudices and life style, and accept the individual by therapeutic interaction even if the student's values are different.
c. Member of a Community	21. Recognize the individual as a member of a community with its own norms, and accept the individual for himself.
d. Cultural Background	22. Recognize the individual's cultural background, its influence upon the individual, and accept the individual in a therapeutic manner.
E. Communication 1. Components of Communication	23. Recall the components of the communication process.
2. Types of Communication a. Verbal	24. Communicate effectively with patients, patient's families, and other health professionals of different ages, socio-cultural groups, intellectual levels, and under various degrees of stress to relate or receive a message. Feedback should indicate if the communication was adequately presented.
b. Non-Verbal	25. Given a situation in a clinical setting, identify his/her non-verbal behavior which helps and/or hinders the patient's ability to respond by use of the process recording.

Topical Outline	Measurable Objectives
c. Written	26. Given a situation, express himself/herself in written communication concisely, accurately and legibly, using medical vocabulary and observed and validated facts in the form of a written examination, charting or via process recording.
3. Therapeutic Communication and Relationships a. Characteristics	27. Differentiate a therapeutic communication from a social conversation by describing their basic differences and by identifying the two types in prepared scripts.
b. Techniques	28. Given a situation, identify the therapeutic communication techniques used during the interaction. 29. Use therapeutic techniques in a conversation, and identify them in a process recording or a tape recording of the interaction.
c. Barriers and Facilitation	30. Identify six of eight commonly accepted communication techniques which facilitate communication. 31. Identify six of eight commonly accepted barriers to communication. 32. Given an interaction, identify the non-therapeutic communication techniques used during the interaction.
d. Stages of Relationships	33. Identify the stages of the therapeutic relationship by describing the progress through these stages during interactions with an individual.
F. Group Dynamics 1. Responsibilities of the Leader	34. Describe at least two responsibilities of an effective group leader.
2. Interaction Patterns	35. Identify four interaction patterns which exist in group dynamics.
3. Problem Solving Process	36. Participate as a member of a group of students which selects a problem and resolves it using the problem solving process.
4. Factors Affecting Change	37. Given a group situation, identify those factors affecting changes.
G. Health Care Team	38. Recognize that he/she is a member of a health care team.

Some Notes Relating to the Measurable Objectives:

1. It is assumed that many of these objectives will be met adequately only if the students are evaluated during clinical experience.

2. Interaction with patients in a clinical setting might be expected before the usual timing of the clinical experience. It is assumed that this might occur as a volunteer in an appropriate community setting.

3. The clinical experience would not include any physical care, but it would include interacting with individuals. Examples of agencies that might be used to gain contact with people might be nursing homes, senior citizen centers, community health agencies, day care centers, hospitals and families in the community.

Training/Education Area: Microbiology

Topical Outline	Measurable Objectives
A. Microscopes	The student will be able to:
1. Oil Immersion Techniques 2. Use, Care and Cleaning 3. Light Adjustment 4. Resolving Power	1. Given a light microscope and a list of its major parts, identify each part and explain the function and care of each part.
	2. Outline the steps involved and then apply the outline by an actual demonstration in each of the following situations: a. use of an oil immersion objective b. preparation and observation of a wet mount slide c. preparation and observation of a hanging-drop slide
5. Other Types a. Electron b. Dark-Field c. Phase 6. Wet Mounts	3. Describe in one or two sentences the basic principle and use of each of the following types of microscopes: a. light b. dark-field c. electron
B. Staining Techniques 1. Simple 2. Gram 3. Acid Fast 4. Special	4. Given examples of the following bacteria as unknown: Bacillus subtilis, Aerobacter aerogenes, Mycobacterium tuberculosis, and Staphylococcus aureus; characterize in the laboratory each of the unknowns for Gram reaction, acid-fastness, capsule formation and endospore formation using the following stains: a. simple b. Gram c. acid-fast d. negative e. spore
C. Sterile Technique 1. Inoculation 2. Subculture	5. Given the appropriate equipment, transfer bacteria from an original culture to a sub-culture without allowing either to become contaminated.
3. Serial Dilutions and Plate Count	6. Given an outline of techniques and a bacterial suspension, determine and calculate the concentration of the original suspension through the use of serial dilutions and plate counts.
4. Hand Washing	7. Develop an awareness of the importance of handwashing prior to and after laboratory work via the following procedures: a. various techniques of handwashing are tried b. wash water samples for each technique will be plated for bacterial counts c. fingers will be touched to sterile plates of media after each technique d. the plates will be observed for bacterial growth e. the student will evaluate the relative effectiveness of the various handwashing techniques
5. Cultures from Common Objects	8. Develop an awareness of the role of fomites in the dissemination of microbes by culturing microorganisms from selected fomites and determining the types of microbial population from each fomite.
	9. State the four criteria which formulate Kock's postulates in the determination of a microbe as a pathogen.
D. Control 1. Definitions a. bactericidal b. bacteriostatic	10. Define and differentiate between the terms bactericidal and bacteriostatic as well as microbicidal and microbiostatic.

Topical Outline	Measurable Objectives
2. General Methods a. Physical b. Chemical c. Biological d. Radiation e. Sterilization	11. Given a list of antimicrobial agents and a list of antimicrobial actions, select those actions which characterize each antimicrobial agent with 80% accuracy.
3. Invivo a. Phagocytosis b. Lysis c. Agglutination d. Chemo-Therapeutic Agents e. Toxins and Antitoxins	12. Given a list of chemotherapeutic agents, describe their antimicrobial action.
4. Sterilization Techniques	
E. Characteristics of Bacteria (Includes Spirochetes)	
1. Physiology	13. Given the names and structural formulas for the following compounds: acetyl CoA, ketoglutaric acid, succinic acid, glucose, glyceraldehyde 3-phosphate, pyruvic acid, citric acid, and oxaloacetic acid; order the compounds according to the process of respiration with 80% accuracy.
	14. Describe the relative magnitudes of energy released in the following processes as a comparison of the efficiency of the processes: a. fermentation b. aerobic glycolysis c. citric acid cycle
	15. Given the method used by a microorganism in obtaining food, classify that microorganism as one of the following: a. chemosynthetic autotroph b. photosynthetic autotroph c. chemosynthetic heterotroph d. photosynthetic heterotroph
2. Anatomy	16. Given a diagram of a procaryotic cell, label the following cell structures: a. nucleoplasm b. cytoplasm c. ribosomes d. cytoplasmic membrane e. cell wall f. capsule g. flagellum h. endospore
3. Organization	17. Label the structures shown in an electron photomicrograph of a typical bacterial cell, and explain how the organization of the cell enhances the necessary functions of the cell.
4. Enzymes	
5. Cultivation Techniques 6. Differential Media 7. Pure Culture	18. Given three identifiable bacterial samples, select three cultivation techniques, and demonstrate and evaluate successful use of these techniques.
	19. Demonstrate the use of differential and selective media by inoculating such media with selected organisms, and by observing the growth of the organisms.
	20. Given one gram of garden soil, outline a procedure and follow that procedure in isolating pure cultures of bacteria from the soil sample.
8. Reproduction and Growth Curve	21. Given a typical bacterial growth curve, identify the following phases of the curve: a. lag phase b. accelerated growth phase

Topical Outline	Measurable Objectives
	c. log growth phase d. decelerated growth phase e. stationary phase f. accelerated death phase
9. Transformation and Transduction Cycles	22. In one short paragraph for each, explain the process and genetic significance of transformation, transduction, conjugation and mutation.
10. Mutation	
F. Protists (Survey of Microorganisms) 1. Characteristics 2. General Classification Scheme 3. General Types a. Bacteria b. Fungi c. Virus d. Other 4. Pathogenic versus Non-Pathogenic	23. Given a list of general characteristics of protists and a list of general types of protists, match the items in the two lists with 80% accuracy.
G. Characteristics of Pleuropneumonia	24. Given a list of the major groups of protists, list two distinguishing morphological features which separate each major group.
H. Characteristics of Molds and Yeasts (Fungi) I. Characteristics of Rickettsia J. Characteristics of Viruses K. Characteristics of Protozoa	25. List two distinguishing characteristics of mycoplasma, and state three typical symptoms of the disease they cause in humans.
L. Normal Flora of the Human Body	26. Discuss the significance of the normal flora of the gastrointestinal tract.
	27. Discuss the significance of the normal flora of the skin.
	28. Discuss the significance of the normal flora of the oral and nasal cavities.
M. Epidemiology 1. Types of Pathogens a. Cultural Characteristics b. Special Tests c. Transmission and Control d. Symptoms of Infection	29. Construct a chart which identifies at least one major human disease caused by each of ten genera of bacteria. The chart should list the main descriptive characteristics, main symptoms of infection, modes of transmission, preventive measures and treatment. The ten genera should include Staphylococcus, Streptococcus, Neisseria, Clostridium, Mybacterium, Salmonella and Treponema.
	30. Construct a chart which identifies twelve human viral diseases. The chart should list the main symptoms of infection, modes of transmission, preventive measures and treatment. The twelve human viral diseases should include smallpox, chickenpox, polio, influenza, rabies, encephalitis, common cold, measles and mumps.
	31. Identify the major human diseases caused by seven genera of protozoa, and list the main descriptive characteristics, main symptoms of infection, modes of transmission, preventive measures and treatments for each genera. The seven genera of protozoa should include plasmodium, trypanosoma, entomoeba, trichamonas and leishmania.
	32. List one significant human disease, its symptoms of infection, its mode of transmission for each of the following: a. fungi b. roundworms c. flukes d. tapeworms e. arthropods
2. Susceptibility to Infection a. State of Well Being b. Age	33. State one method in which each of the following makes man more susceptible to infection: a. age of individual

Topical Outline	Measurable Objectives
c. Disease State d. Chemo-Therapeutic and Radiation Effects e. Burns f. Ethnic and Environmental State	b. burns c. use of drugs d. exposure to radiation e. presence of another disease f. environmental stress g. ethnic background
3. Body Defenses (Normal Mechanisms) a. State of Well Being b. Age c. Skin d. Mucous Membrane e. Cilia f. pH g. Inflammatory Response h. Immune Response	34. Write a paragraph of no more than 100 words on the role of each of the following normal body defense mechanisms including at least two specific methods for each mechanism by which the body prevents invasion by microorganisms: a. state of well being b. age c. skin d. mucous membrane e. cilia f. pH g. inflammatory response h. immune response
	35. Describe and give an example of at least one body defense mechanism involved in each of the following processes: a. phagocytosis b. lysis c. agglutination
	36. Define and relate the origin of each of the terms toxin and antitoxin to either the host or the pathogen.
4. Immunity a. Specific and Non-Specific Factors in Blood 1. Complement 2. Ability to Make Antibody	37. Use the following terms in writing an accurate model of the process of complement-fixation: a. antigen b. antibody c. serum d. lysis e. bacteria f. complement g. heat
3. Antigen-Antibody Reaction	38. Given the situation where a patient receives a gamma globulin injection, and given a written paragraph which hypothetically explains the process of immunity within that patient, separate the correct from the incorrect statements in the paragraph with 80% accuracy.
b. Natural (Active and Passive) c. Acquired (Active and Passive)	39. Given the following series of conditions involving immunity, match each condition with the appropriate type of immunity with 80% accuracy: Type of Immunity a. natural b. acquired 1. active 2. passive Conditions a. a gamma globulin injection b. resistance to polio entrance c. inoculation of attenuated polio d. ticks die when placed upon patient e. resistance to smallpox vaccination
N. Applied Microbiology 1. Industrial 2. Water	40. Distinguish between food intoxication and food infection. 41. Name the organisms involved and describe in a general way

Topical Outline	Measurable Objectives
3. Sewage 4. Dairy Products 5. Air 6. Food	(i.e. endotoxin, enterotoxin, exotoxin) the bacterial product which causes such symptoms. 42. Describe food sources from which one might expect various types of intoxication/infections to be contracted. Be aware of food handling/preparation/storage procedures which tend to minimize this problem, or maximize it if not properly followed. 43. Given the following list of processes and products of applied microbiology and the following list of microorganisms, match the appropriate microorganisms with each process or product with 80% accuracy. **Process or Product** a. Beer b. Vinegar c. Water Quality Testing d. Roquefort Cheese e. Buttermilk f. Chloramphenicol g. Wine h. Bread i. Cultured Sour Cream j. Swiss Cheese k. Bacitracin **Microorganisms** a. Streptococcus lactis b. Streptomyces venezuelae c. Bacillus subtilis d. Saccharomyces cerivisiae e. Saccharomyces ellipsoideus f. Acetobacter g. Penicillium h. Escherichia coli i. Propionibacterium
O. Soil and Environmental Degradation	44. Use each of the following list of terms in writing a description of the role of microorganisms in natural and man-made ecosystems: a. nitrification by soil bacteria b. decomposers c. coliforms in sewage d. biodegradation e. B. O. D. of water f. exoenzymes g. heterotrophic h. substrate i. eutrophication j. aerobic k. anaerobic

Topical Outline	Measurable Objectives
A. Food and Its Relation to Health	The student will be able to:
1. Food: Sources, Meaning and Problems a. Animal b. Vegetable c. Synthetic d. Environmental Effects e. Geographical Effects	1. Briefly describe each of the following, and discuss the interrelationships among the following: a. The relationship of food to health. b. The animal, vegetable and synthetic sources of food. c. The effects environment and geography have on food availability and selection. d. The meaning of food and "Why people eat as they do".
2. World Considerations a. Diets of Various Countries 1. Cultural Values 2. Religious Values	2. State at least two ways in which culture and religion can affect the diet of a society by giving examples in an oral group discussion.
3. Psychological, Sociological and Economic Factors	3. Identify three psychological, three sociological and three economic factors that affect the food selection of a young healthy adult of three countries: the U.S. and two other countries.
b. Supply and Demand	4. State five facts that will illustrate the relationship of the world food supply to the world's population demands.
c. Nutrition versus Malnutrition	5. Compile a list of clinical manifestations of six physical characteristics of a malnourished teenager.
B. The Nutrients: Their Characteristic Functions, Digestion, Absorption, Transport, Metabolism, Sources, Daily Requirements and Energy Values 1. Amino Acids and Proteins	6. List the major sites of digestion for proteins, carbohydrates, and lipids.
2. Carbohydrates	7. List the major sites of absorption for proteins, carbohydrates, and lipids.
3. Lipids	8. Select the circulatory system (blood or lymph) into which carbohydrates, fat, and protein are absorbed.
	9. Given a menu for the main meal of a day, identify the foods that supply protein, lipids, and carbohydrates.
	10. State the normal and/or recommended ranges in grams and percent of calories of carbohydrate, lipid and protein to be included in the daily diet of a young adult of moderate activity.
	11. State the average physiological fuel value for proteins, lipids, and carbohydrates, and given a diet prescription, calculate the calorie content of the diet.
	12. Define the term metabolism; discuss protein quality, protein-calorie malnutrition, and functions of essential amino acids; and state three functions of dietary lipids.
4. Minerals	13. Given the R.D.A. and food tables as references, determine the adequacy of a given day's diet for calcium and iron.
a. Fluid and Electrolyte Balance b. Co-Factors	14. Given the list of: Na^{+}, K^{+}, Ca^{+2}, HCO_{-3}, PO^{-4}, Cl^{-} and protein, match each substance with its major extracellular

Topical Outline	Measurable Objectives
	or intracellular location(s), and describe, in writing, water balance upon shifts of these substances across cellular membranes.
c. Structural Minerals (e.g. Calcium, Phosphorous)	15. Given a list of major physiological functions of minerals, match the minerals with their functions.
5. Vitamins	16. After defining vitamins, write a paragraph that clarifies the use of naming by letter designation and the use of chemically descriptive names. Given a label from a multi-vitamin preparation, match the common with the chemical names.
a. Fat Soluble	17. Name the four fat-soluble vitamins in a short paragraph that includes one major function for each of the four fat-soluble vitamins, one effect of deficiency and three food sources.
b. Water Soluble	18. Given a list of the water soluble vitamins, match the vitamin with the corresponding function and/or deficiency state.
	19. Using a Recommended Dietary Allowances chart and food tables, estimate the adequacy of a given diet for ascorbic acid, vitamin A, riboflavin and thiamine.
C. Metabolic Interrelationships of the Nutrients	20. Given the following list of major metabolic interrelationship patterns, describe in a short paragraph each interrelationship: a. carbohydrates, B-vitamins and phosphorous b. protein and calories c. iron and ascorbic acid d. lipids, fat-soluble vitamins and bile salts e. calcium, phosphorous, and vitamin D
D. Food Selection 1. Food Groups	21. Plan a menu for one day for a young adult so that all food groups of the Basic Four are included in the diet in adequate amounts for that age.
2. Meal Planning (Use of Food Composition Tables) 3. Factors Influencing Food Habits and Dietary Planning a. Nutritional Factors b. Psychological and Esthetic Factors c. Social and Economic Factors d. Cultural Factors e. Geographic Factors	22. Using the menu completed under measurable objective No.21, and food composition tables, accurately calculate the levels of energy, protein, and iron content of the day's intake. 23. Given a description of a family and a brief summary of the psychological, cultural, geographic, and economic factors involved, plan a menu for one day containing foods that would be acceptable to the family and meet their nutritional needs as determined by the Basic Four: (e.g. a 36 year old, black woman on welfare, 75 lbs. overweight, living in Atlanta, Georgia with two children, (ages 1 and 5).
f. Religious Factors	24. Given a typical hospital menu, select all items listed that would be objectionable to a member of: the Orthodox Jewish faith, the Seventh Day Adventist Church, and the Church of the Latter Day Saints (Mormon Church).
g. Technological Factors	25. State five differences, which may be attributed to industrial food technology, in the food supply to a family living in an isolated area compared with a similar family in an urban setting.

Topical Outline	Measurable Objectives
	26. Plan a shopping list for foods to be taken backpacking into a remote camping area for a three-day stay that will provide a balanced dietary intake for one person.
h. Multi-Media Effects	27. Contribute to a small group discussion on "how multi-media affects food selection," by giving a minimum of three examples.
E. Safeguarding the Food Supply	
1. Food Borne Diseases	
2. Food Quality and Safety	
a. Variables in Production	28. Using references available, discuss the following statement: "Crops grown on soil that has been depleted from overuse are deficient in nutrients."
b. Comparison of Sources	29. Using references, list which nutrients are added to enrich wheat flour under the Federal Food and Drug Administration guidelines.
c. Effects of Processing	30. List three or four food additives, their purposes and whether they are to modify a property or to improve the nutritional value of the food.
1. Refining	
2. Milling	
3. Additives	
d. Storage and Handling (Commercial and Home)	31. Given a list of food items, tell how to store the items properly to maintain quality and safety.
e. Preparation (Commercial and Home)	
f. Control of Quality	32. Given a list of areas of food handling that need enforcement of controlling standards, match these with the agency responsible for inspection and enforcement.
1. Governmental (e.g. Health Department, FDA, USDA)	
2. Personal	
F. Nutritional Needs in Life	33. Given one day's menu for an adequate food plan for a 25 year old woman, change the menu to adequately meet the needs of pregnancy and lactation.
1. Pregnancy and Lactation	34. Compare human and cow's milk for the human infant for protein and carbohydrates by giving the reasons for the routine modifying of cow's milk.
2. Infancy	
3. Youth	35. Using references, the student will be able to compare the nutrient and calorie needs for preschool (2-6), school-age (6-12) and adolescent youth.
	(See measurable objectives No. 6 through No. 19.)
4. Maturity	
5. Aged	36. Given a list of the major nutrient classes and energy, compare whether or not the need is the same, greater or less for the aged than it is for the young adult.
	37. Given a list of physiological and biochemical changes, accurately identify those that occur in aging.
G. Modifications of Normal Diets	
1. Overweight and Underweight Conditions	38. Given a standard height-weight table, determine what his/her desirable weight range should be.
	39. Given a basic diet pattern for an adult female in good health, state how the diet should be modified to meet the following special needs: weight loss indicated and weight gain indicated.
2. Gastrointestinal Tract Disturbances	40. Given a particular disease or disturbance of the GI tract, plan using references, a dietary regime and write a short paragraph that could be used in counseling the patient. (A list of GI tract disturbances would include diarrhea, constipation, peptic ulcer and gastritis.)

Topical Outline	Measurable Objectives
3. Metabolic and Genetic Disorders	41. Given a normal well-balanced menu for one day, recognize the major dietary modifications necessary for six of the most common metabolic genetic diseases: diabetes, hypoglycemia, gout, hyper- and hypothyroidism, Addison's disease, PKU (Phenylketonuria) and cystic fibrosis.
4. Emotional Disorders	42. Perform as a member of a health-care team in a role playing situation, counseling an alcoholic, an emotionally disturbed person, and a person dependent on drugs, concerning each of their nutritional needs and encouraging each of them to include foods from the Basic Four groups, for adequacy.
5. Cardiovascular and Renal Disorders	43. Given six of the possible common disorders of the cardiovascular and renal system and using references, state a major dietary modification required for each, and write one or more foods to be avoided for each.
6. Infectious Diseases	44. Match symptoms and diet changes necessary for individuals who have fever and/or an infectious disease.
7. Pre-Surgical and Post-Surgical a. Progressive Diets b. Tube Feeding	45. Given a list of beverages and using references, select with 100% accuracy three beverages for each of the following possible needs of surgical patients and/or burned patients: high protein, high vitamin C and high potassium.
H. Nutrition and Public Health Challenges 1. Consumer Education a. Changing of Food Habits	46. Working in groups of four, design a project to work with a small group of nutritionally high-risk individuals (elderly, preschoolers, pregnant teenagers, etc.). The aim of the project is to be able to identify the nutritional needs, provide useful information, develop an awareness of good food habits and to bring about a change in the food habits of the participants.
b. Marketing Evaluation 1. Advertising 2. Convenience 3. Packaging and Display of Food 4. Fads	47. Bring to the class two examples of food packaging, convenience items and advertising, and discuss the effects of food industry marketing approaches on the consumer.
	48. Given four claims of health food faddists, write a short paragraph applying scientific nutritional principles to refute or support each claim.
2. Mechanics for Change a. Services and Organizations 1. Local 2. State 3. National 4. International	49. After investigation of resources available, list five organizations that provide information and programs to help change dietary habits.
b. Multi-Media/Mass Communication	50. Write and tape a 30-second radio spot on nutrition.

Training/Education Area: Public Health and Health Care Delivery

Topical Outline	Measurable Objectives
A. Public Health	The student will be able to:
1. Population Trends and Public Health	1. Given graphic statistics on population trends in the United States, compare current population trends with population trends of the past five census tracts. (This material will be collected and given to each instructor in the form of a workbook.)
2. Statistics in Public Health and Medical Research	2. Recognize and review the accepted national method of collection and storage of public health statistics. 3. Define the following terms as they are used in public health statistics: a. biometrics b. demography c. birth rate (use a formula) d. death rate (use a formula) e. morbidity f. mortality g. ten leading causes of death
3. Health Planning Process a. Planning Process 1. Assessment of Needs 2. Delineation of Problem 3. Planning 4. Implementation 5. Evaluation	4. List and describe the characteristics of the five basic steps in the problem-solving method as applied to health planning.
b. Continuity of Care 1. Prevention 2. Emergency 3. Acute 4. Chronic 5. Sub-Acute or Rehabilitation 6. Custodial	5. Given the definition of continuity of care and the definitions of the six categories of continuity of care listed below, give three examples of one individual moving from one category of care to another: a. preventive b. emergency c. acute d. chronic e. sub-acute or rehabilitation f. custodial (Definitions from the State Department of Health will be provided to the instructor.)
c. Resources: Needed and Available 1. Manpower 2. Facilities 3. Services 4. Financial 5. Education/Training	6. Given an example of a consumer seeking a specific health service in a community, identify which of the following resources is missing: a. manpower b. facilities c. services d. financing e. education/training
d. Legislation/Regulation Review	7. Discuss the relationship of legislation/regulation review to the consumer as well as the provider utilizing basic knowledge of the legislative process at the local, state and federal levels.
4. Public Health Problems a. Problem Identification and Priorities	8. Given a description of a community in turmoil, isolate three community problems and determine which of the three requires the most immediate action. (The instructor will be provided with a brief description of a community in turmoil with at least five observable problems.)
b. Analysis of Public Health Problems (Epidemiology)	9. Given the above situation, name the host, agent and en-

Topical Outline	Measurable Objectives
1. Host 2. Agent 3. Environment	vironment which are operational in the priority problem identified in objective No.8.
c. Analysis of Personal Health Problems (Etiology) 1. Cause 2. Effect 3. Treatment	10. Having completed objectives No.8 and No.9, define the cause, effect and treatment of the personal health problem existent in the priority which was established in objective No.8.
d. Chain of Infection 1. Etiologic Agent 2. Reservoir 3. Mode of Escape 4. Mode of Transmission 5. Mode of Entry 6. Susceptible Host	11. Explain the components of the chain of infection which are: a. etiologic agent b. reservoir c. mode of escape d. mode of transmission e. mode of entry f. susceptible host
5. Infections and Public Health a. Environmental Infection Hazards 1. Animal Infections Transmissible to Humans	12. Given the host, agent and environmental concept, apply the concept to the major reported animal infections transmissible to humans by: a. identifying one animal infection b. describing the chain of that infection c. selecting an appropriate method of interrupting the chain
2. Human Infections in Which the Infective Agent has Requisite Pre-Transmission Period of Extra Human Residence	13. Given the host, agent and environmental concept, apply the concept to the major reported human infections residing in extra-human sources during pre-transmission period by: a. identifying one human infection as described above b. describing the chain of that infection c. selecting an appropriate method of interrupting the chain
3. Human to Human Infection Transmission in Which the Infective Agent may Persist in the Environment	14. Given the host, agent and environment concept, apply the concept to the major reported human to human infections in which the infective agent may persist in the environment by: a. identifying one infection which fits this description b. describing the chain of that infection c. selecting an appropriate method of interrupting the chain
4. Diseases Caused by Preformed Microbial Products Without True Infection of Diseased Host	15. Given the host, agent and environment concept, apply the concept to the major reported diseases caused by preformed microbial products without true infection of the diseased host by: a. identifying one infection which fits this description b. describing the chain of that infection c. selecting an appropriate method of interrupting the chain
b. Control of Infectious Diseases Acquired from Environment 1. Infectious Diseases Carried by Water	16. Describe two approved methods of controlling infectious diseases carried by water.
2. Infectious Diseases Carried by Milk and Other Foods	17. Describe two approved methods of controlling infectious diseases carried by milk and other foods.
3. Animal Reservoirs and Arthropod Vectors of Infectious Diseases	18. Describe two approved methods of controlling infectious diseases transmitted by arthropod vectors and stored in animal reservoirs. 19. List the major infectious diseases found in animal reservoirs and transmitted by arthropod vectors.

Topical Outline	Measurable Objectives
4. Infectious Diseases Carried by Air	20. Describe two approved methods of controlling infectious diseases carried in the air.
5. Infectious Diseases Carried in the Soil	21. Describe two approved methods of controlling infectious diseases carried in the soil. 22. List the major infectious diseases carried in the soil.
c. Humans as Infection Hazard 1. Primarily Enteric Infections	23. Considering the human as a potential infection source, list two enteric infections, and describe the chains of those infections (as determined in objective No.11).
2. Primarily Respiratory Tract Infections	24. List two respiratory tract infections, and describe the chains of those infections.
3. Venereal and Other Direct Contact Infections	25. List two venereal infections, and describe the chains of those infections.
4. Infections Which Can be Artificially Transmitted by Inoculation	26. List two infections which are artificially transmitted by inoculation, and describe the chains of those infections.
d. Control of Infections Acquired from Humans	27. List five methods accepted by the State Department of Health for controlling the spread of infections from one human to another.
6. Other Public Health Hazards a. Accidents b. Poisons, Drugs, and Food additives c. Pollution (Air, Water, Soil, Noise) d. Natural Disasters (Fire, Flood, Earthquake, Hurricane, Tornado) e. Sanitation Problems f. Epidemics	28. Given examples and rates of incidence of each of the following categories of public health hazards, suggest a method of prevention and control of each category in four sentences or less: a. accidents b. poisons and drugs c. food additives d. pollution (air, water, soil, noise) e. natural disasters (fire, flood, earthquake, hurricane, tornado) f. sanitation problems g. genetic hazards h. epidemics (Resources will be made available.)
7. Health Protection a. Pre-Natal b. Infancy c. Pre-School d. School-Age e. Adolescence f. Middle Age g. Maturity (Instructor may choose another age grouping.)	29. Identify one example of health protection for each of the following age groups: a. pre-natal b. infancy c. pre-school d. school-age e. adolescence f. middle age g. maturity
8. Rehabilitation a. Psychological b. Sociological c. Physical	30. Write one example of rehabilitation for each of the following problem areas. a. Mental and Emotional Inadequacies 1. mentally ill 2. alcoholic 3. drug addict 4. mental retardate b. Sociological Inadequacies 1. isolation 2. unemployment c. Physical Inadequacies 1. crippled child 2. handicapped adult 3. disabled elderly 4. speech disorders

Topical Outline	Measurable Objectives
B. Health Care Delivery	
1. Health Care Delivery System	
a. Some Factors to Consider	
1. Geographic Location	31. Compare the health care delivery system of one geographic location to the health care delivery system of a contrasting geographic location.
2. Characteristics of People	32. Develop an awareness of the effect of the characteristics of a given population upon the health care delivery system that serves the population, through: a. identifying the characteristics of a given population (race, ethnic origin, age, religion, etc.) b. observing the health care system that serves that population c. considering the inter-related factors d. exploring the adequacy of the existing system by listing its pros and cons in no more than 100 words e. suggesting one alternate health care delivery system
3. Major Occupations	33. Develop an awareness of the effect of the major occupations in a given community upon the health care delivery system that serves that community, through: a. identifying the major occupations in a given community b. observing the health care delivery system in that community c. exploring the adequacy of the existing system by listing its pros and cons in no more than 100 words d. suggesting one alternate health care delivery system
4. Educational Systems	34. List three educational systems and describe each system's effect upon the health care delivery system.
5. Environmental Factors	35. Describe five environmental factors that have a direct effect upon the health care delivery system.
b. Community Characteristics	
1. Community Organization	36. Construct an organizational chart of the governing body of a given community. (city or county)
2. Mechanisms for Planning	37. Utilizing the organizational chart constructed in objective No.36, solve a given health problem within that community framework by devising a plan using no more than ten steps.
3. Multiple Causation	38. Utilizing the problem and community information from objectives No.36 and No.37, identify at least five inter-related causative factors of that problem.
c. Financial Aspects	
1. Health Care Costs 2. Health Insurance (Private, Government, Group, Individual)	39. Through lecture and discussion, be aware of the various types of health insurance and describe in 200 words or less the differences between: a. government versus private b. group versus individual
3. Preventive Health Care Insurance and Curative Health Care Insurance	40. Given an example of preventive health care insurance (HMO) and curative health care insurance (common carriers such as Blue Cross - Blue Shield), examine each type, select an individual preference and support the selection in a paragraph of 200 words or less.
d. Organizational Components	
1. Public Agencies and Organizations a. International	41. Through lecture and discussion, define in four sentences or less the following organizational components as related to

Topical Outline	Measurable Objectives
b. National c. State d. Local 2. Educational/Training Institutions 3. Private Organizations and Associations 4. Professional Associations and Societies	health care systems. a. Public Agencies and Organizations 1. international 2. national 3. state 4. local b. Educational/Training Institutions c. Private Organizations and Associations d. Professional Associations and Societies 42. Given a list of ten organizations, e.g. Harvard, Rockefeller Foundation, American Cancer Society, Visiting Nurse Association, PAHO, etc., state with 100% accuracy the organizational component to which each relates.
e. Current Trends 1. Consumer Participation in Decision Making 2. Innovations in Health Care Planning 3. Health/Medical Legislation	43. Through group discussion of the following areas: a. consumer participation in decision making b. innovations in health care planning c. health/medical legislation be familiar with current trends in the health fields. Attend class and participate in the discussion.
2. Teamwork in Health Care Delivery a. Principles 1. Continuity of Care 2. Understanding and Using Health Services	44. Given an example which would include necessary information, a. identify five health needs of the individual b. name five possible health team members to meet these needs c. name five possible agencies involved d. state one method of coordinating the care for this individual. (Suggested example: An unemployed 43 year old white male suffering from silicosis following 10 years of employment at a granite quarry, seeks health care at the Neighborhood Health Center.)
3. Image of Health Worker	45. Following a panel presentation of three (3) or more consumers, be conscious of the health workers image as perceived by the presentation coverage of at least five of the following items: a. Differences that exist between health occupations, e.g. 1. psychologist vs. psychiatrist 2. optometrist vs. ophthamologist b. Would you be more likely to follow a diet prescribed by a physician or a nutritionist? c. Do you feel a nurse is capable of counseling you regarding your child's behavior? d. What does a sanitary engineer do? e. What is a physical therapist? an occupational therapist? a respiratory therapist? f. Who provides you with health care when you are ill? g. Is it possible to be cared for in your home? h. Where should health workers be educated, in colleges and universities, in vocational schools, in hospitals, or on the job? i. Do you feel health workers are fairly compensated? j. Would you prefer to die at home, in a hospital or in a nursing home? Who would you like to be present?
4. Specialty and Professional Self-Interests b. Types of Health Care Delivery Systems 1. Physicians a. Solo Practice b. Team Practice c. Group Practice	46. Following a discussion of solo, team and group physician practice, list two advantages and two disadvantages of each type of physician practice as regards health care delivery.

Topical Outline	Measurable Objectives
2. Public and Private Agencies	47. Through field trips to public and private agencies, become acquainted with various types of health care delivery systems.
3. Other Systems (HMO, Kaiser Permenente', Systems of Other Nations)	48. Through visual aids, view other health care delivery systems, e.g. HMO, Kaiser Permenente', and health care delivery systems of other nations.
c. Organization of the Health Care Team 1. Components or Specialties 2. Functions 3. Problem Solving via a Cooperative Approach	49. Given a situation where the health care system is inadequate, state: a. team member composition and the specialty groups represented b. team member functions c. choose a method of problem solving utilizing a cooperative approach. (Suggested situations will be provided to the instructor.)
d. Consumer Participation 1. Input Planning 2. Protection	50. Determine and list the membership of consumers and providers on a mock advisory board of a health agency. The decision should support two factors safeguarding: a. input planning b. protection of health standards
e. Health Manpower 1. Distribution 2. Needs and Demands 3. Supply and Resources	51. Given the necessary data pertaining to South Dakota (vital statistics, public health statistics), become aware of health manpower in relationship to health care delivery through: a. studying the distribution of manpower (physicians, nurses, sanitarians, etc.) b. studying the relationship of needs and demands of consumers c. studying the supply and resources of providers Based on the above study, suggest by writing 200 words or less one change in health manpower that would improve the health care delivery system.